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Chicago, September 28, 1929 (*Issued Every Other Week*) Volume XXXII, No. 20

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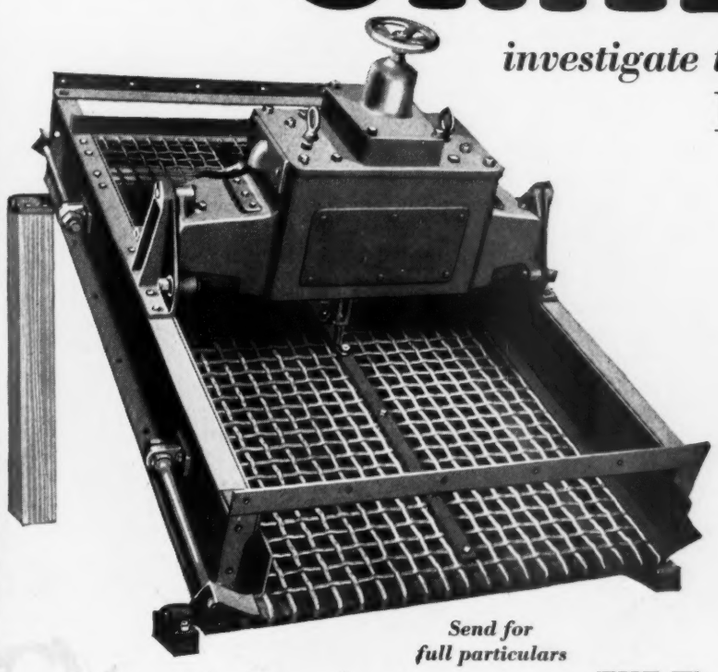

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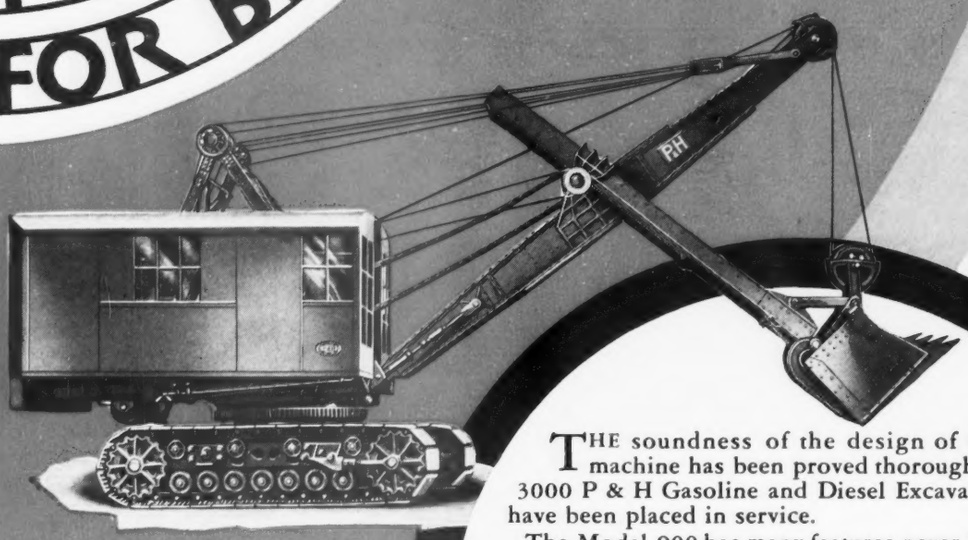

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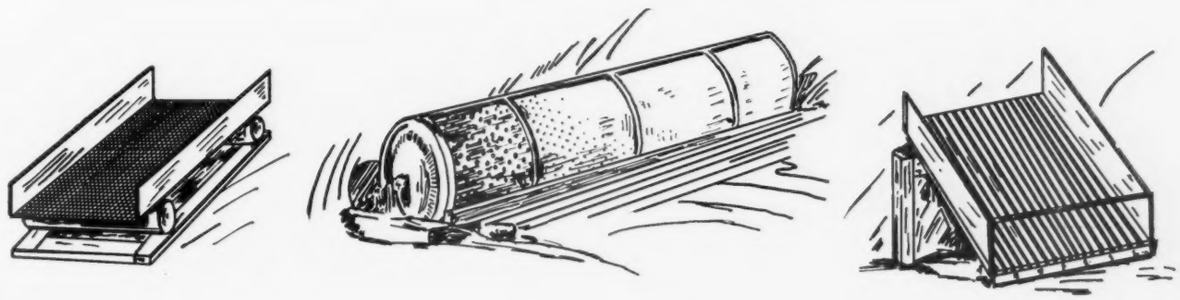

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The Largest Paid Circulation Covering the Rock Products Industry

Rock Products

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542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

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NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
WALTER B. LENHART, *Associate Editor*
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Volume XXXII Chicago, September 28, 1929 Number 20

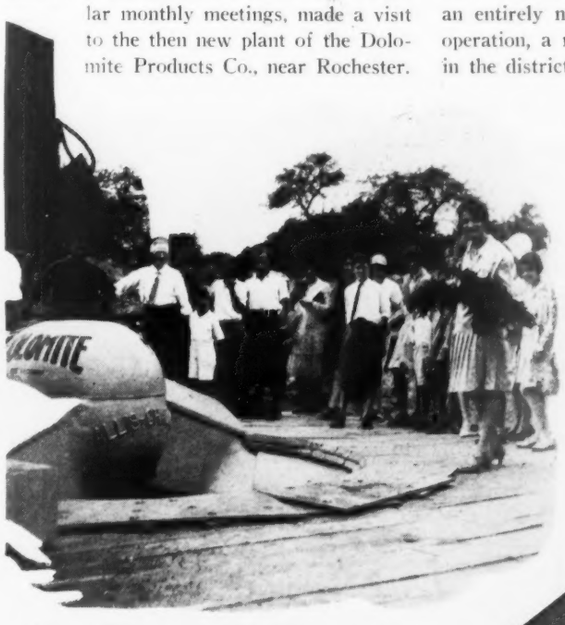
Penfield Plant, Dolomite Products Company

Labor Saving in Quarry and Crushing-Plant Operation Logically Carried Out

By John J. Landy
Associate Editor, Rock Products

SOME YEARS AGO, members of the New York State Crushed Stone Association, in the course of one of their regular monthly meetings, made a visit to the then new plant of the Dolomite Products Co., near Rochester. They came, they saw and wondered, and after they had gone their respective ways, they considered what they had seen. It was an entirely new idea in crushed-stone plant operation, a radical departure from practice in the district, or for that matter in the entire country. The plant had no elevators and no screens; that is, no screens of the usual type, for the roll grizzlies in use there could hardly be classed as a screen in the accepted sense of the word. Motor trucks were used to carry the rock from the quarry to the primary crusher at the plant, a 42-in. gyratory. There were only a few employes needed to operate, but the production was about 2500 tons per 10-hour day. Is it any wonder that the visitors made comparisons?

But this article does not deal with the above plant; it merely alludes to it as the forerunner of the present new plant recently opened by the Dolomite Products Co., for the basic design of both plants is identical, the newer containing



Above—Dedication of "Dolomite, the Second," the Penfield plant of the Dolomite Products Co. Below—General view of the new plant

Showing the nature of the top soil of the new quarry

Drilling in the stripped area

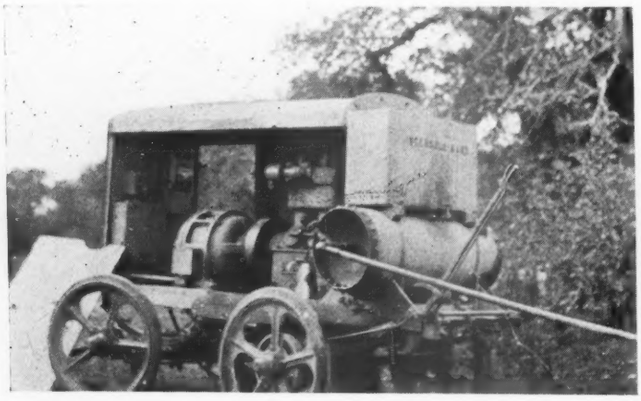
some refinements in operation which John Odenbach, designer, builder, president of the company, has incorporated. No visit to the Dolomite plants would be complete without a few words about John Odenbach, the founder of the Dolomite company and truly one of the most conspicuous figures in the crushed-stone industry. A rare combination of the "idea" man and the practical builder, one who has made many of his operating "schemes" stand up—that is John Odenbach. He is a natural-born engineer, absence of a college sheepskin being more than made up by his substantial practical knowledge and achievements. Sufficient to say, the many elements which go to make "Dolomite" a success are due to his planning.

Just about six months after ground was broken for the new plant and quarry, the plant was completed and producing its first crushed stone. First work on the plant started on January 10, and stripping of the quarry on January 20; the first blast was on March 25. These dates are significant, for it must be remembered that the quarry site was farm land which had to be cleared, a good road had to be built to the site, equipment and materials for construction had to be brought through the heavy snowed-in area, and many other difficulties had to be encountered, such as extremely cold weather.

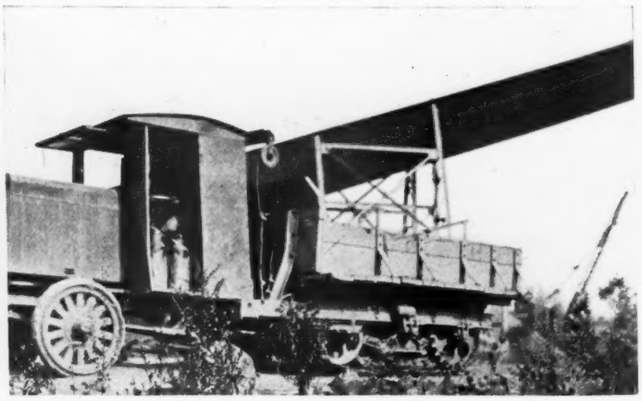
Dolomite No. 2, as the new Penfield plant was christened on July 6 last, is in the village of Penfield, about four miles east of Rochester. It was formally opened on that date with appropriate ceremonies, a large number of visitors attending; Miss Lucille, eldest daughter of Mr. Odenbach, broke a garland-bedecked bottle of pre-war champagne on the dust cap of the large gyratory crusher as a signal for the first stone to be dropped into the crusher. As an additional feature of the christening ceremonies Matthew P. Odenbach, vice-president of the company, had arranged a salute of 21 sticks of dynamite. They were exploded at intervals, a presidential salute to the general manager of the company, which from a modest beginning has grown in less than 10 years to a company with a corporate worth exceeding $1,000,000, and one of the largest factors of the stone crushing business of western New York state.

In the location of the plant, cognizance was taken of the large developments in that district; Rochester is experiencing a real estate and development boom, eastward, which takes in Browncroft and Pittsford and is expected to extend to Penfield and beyond. New developments need new pavement, concrete aggregates, etc., and new roads must be laid to properly connect the area with the metropolitan districts. This is exactly what is happening, and the new plant is right close to the scene of activity. It may be said that, before the new plant, Dolomite operated a small unloading plant in the east end of the city to supply the demand.

The new quarry was opened on 143 acres of farm land acquired after extensive test drilling. Most of this property is underlaid with stone, but only a few acres are under development, the remainder being held as a reserve with farming still going on. The initial quarry opening is fairly long and narrow; the face is now 47 ft. high and this will be extended to 72 ft., a height determined on previously. From 6 to 10 ft. of a loamy topsoil has to be removed to get at the stone, and for this purpose a Marion model 450, gas-electric shovel on caterpillar treads,



Portable compressor supplying air for jackhammer drills



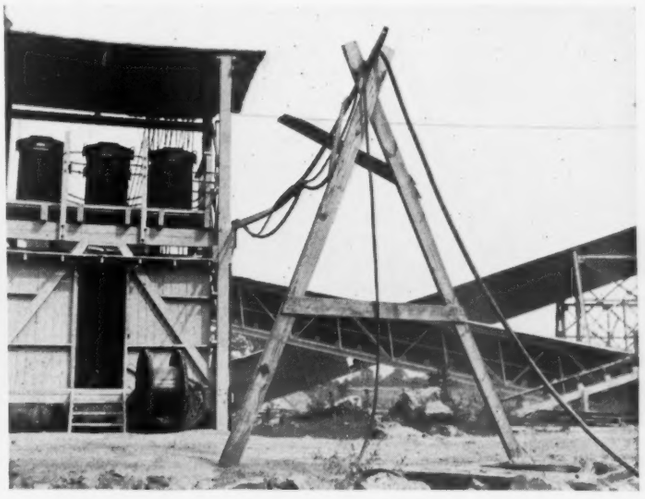
One of the tractor-trucks for transporting strippings

equipped with 1¼-cu. yd. bucket, is used. This shovel loads to Linn tractor-trucks with 5-cu. yd. wood bodies. The tractor-trucks have proven quite suitable for the work, their caterpillar treads enabling them to go over the rough ground, and they have stood up quite well under the hard working conditions encountered. An attempt was made to use them for conveying rock from the quarry to the crusher, but they were found not to have sufficient speed for this type of work.

Part of the conveyor system connecting the primary crushing and screening plant with the main sizing plant and bins

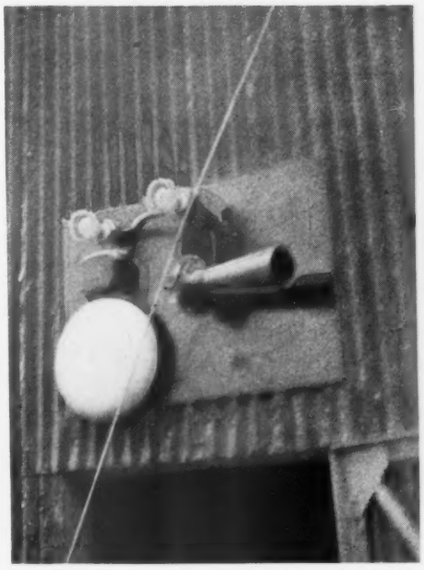
Blast-hole drilling is accomplished by two Sanderson-Cyclone electric well drills, each equipped with a 5⅝-in. bit. Holes are sunk to the 47-ft. depths and, since the quarry is still in the opening stage, the spacing between and back from the face is as yet not fixed. Shots are made every week, because of the proximity to town, and the possible inconvenience of heavier shots to neighbors. About 15,000 tons of rock are broken down with each shot; Hercules 60% gelatin dynamite is used. The rock is a siliceous dolomite, giving on recent analysis: $CaCO_3$, 36 to 38%; $MgCO_3$, 26 to 27%; SiO_2, 28%. So high a percentage of silica leads one to believe that good hydraulic lime could be made from this rock, and perhaps John Odenbach will one day become a lime producer. His other deposit on the west side of the town is an excellent dolomite of remarkable purity.

Looking down into the quarry opening



Portable transformer station

The quarry was quite dry when visited, due no doubt to the unusual drought in the section, but in the event that water is encountered or any seeps in, it will be removed by a Morris centrifugal pump, 800 g.p.m., driven by a 25-hp. motor, and another 10-in., 3600 g.p.m. pump driven by a 75-hp. motor. There is also in the quarry a portable, electrically-operated, 150-cu. ft. per minute Ingersoll-Rand air compressor which supplies air for two Ingersoll-Rand "Jackhamers" used in secondary drilling.



Signal devices—a siren, bell and electric light—mounted near the primary crusher

Six-Wheel, 14-Ton Trucks

Because of the present limited area on the quarry floor, the trucks have to run down a short incline to the loading shovel. This is only a temporary arrangement and will be superseded by another and more direct method when the quarry is fully developed. Another Marion electric shovel, a model 490, full-revolving on crawler treads and equipped with 2¼-yd. bucket, loads the quarry rock to the trucks. Regarding these trucks, they are all Macks, model AK-6, 6-wheeled, fitted with solid tires. The bodies are all-steel, made to John Odenbach's design, and hold from 11 to 15 tons of rock. This is the first heavy duty six-wheel hauling installation made by the Mack Truck Co.

After loading, the truck goes up the same incline it passed down and then backs down a short straight level stretch to the primary crusher, where the contents are dumped. The crusher is a 42-in. Allis-Chalmers driven by a 200-hp. Allis-Chalmers motor through a Texrope drive. Directly over it a 6-ton Chisholm-Moore electric hoist rides on a steel I-beam; this hoist is for dumping trucks (they are not now supplied with dumping mechanism) and is remote-controlled by pushbutton located near the mouth of the crusher. Three trucks working in rotation supply the rock to the crusher. The haul is quite short; only about 250 ft. round trip. Each truck makes a trip every 5 minutes, carrying from 7 to 8 tons of rock, which later will be increased to full capacity of 14 tons.

The gyratory discharge opening is set at 4 in., and the discharge goes to a small hopper box which feeds the *A* conveyor, a 7-9-ply United States Rubber Co. 42-in. belt, 105 ft. centers, driven by a 25-hp. Allis-Chalmers motor with a Texrope short-center drive. This conveyor in turn discharges to another steel box which feeds the material to the *B* conveyor, a United States Rubber Co. belt 42 in. wide, 110 ft. centers, driven by a 25-hp. Allis-Chalmers motor with Texrope. The discharge of this conveyor is to the scalping roll grizzly in the secondary crusher building, a steel-framed structure, covered with asphaltic-protected steel siding, located close to the primary crusher. Both conveyors run in steel carriage frames, equipped with 3-roll Timken bearing idlers, Alemite fitted for lubrication; the idlers were built to John Odenbach's own specifications by the Brownhoist Co., Cleveland, Ohio. Conveyor galleries are of steel-frame construction, the weather side housed with Robertson asphaltic protected corrugated sheathing, and have walkways of 2-in. hardwood planks, firmly bolted in place. The Alemite fittings are extended outwards so as to facilitate lubrication.

The scalping roll grizzly is of John Odenbach's own design and is one of several used in this plant and in the older Gates plant. It consists of six sets of manganese-steel rolls, driven as a unit from a worm gear shaft, running in an oil tight casing. The rolls are of manganese and nickel alloy, to resist the wear of the stone, made especially for the Dolomite company by the Willsea Works, Rochester.

The discharge of the primary gyratory passes over the roll, and material 3¾-in. and over is chuted to the secondary crusher, a No. 5½ Symons cone, direct-driven by a 150-hp. Allis-Chalmers motor. Throughs of the grizzly pass to an underneath Niagara double-decked vibrating screen; the upper deck has 1-in. and the lower deck, ⅜-in., manganese-steel, wire cloth. All stone rejected by the upper deck drops to the box feeding the *C* conveyor; the material ⅜ in. and under goes to the waste conveyor, 50-ft. centers, a 24-in. rubber belt driven by a 3-hp. motor with Texrope. This waste material contains some dirt from the strippings; however, there is an excellent demand for this material for filling at a good price. At present the waste conveyor is building a stockpile which can be reclaimed to trucks.

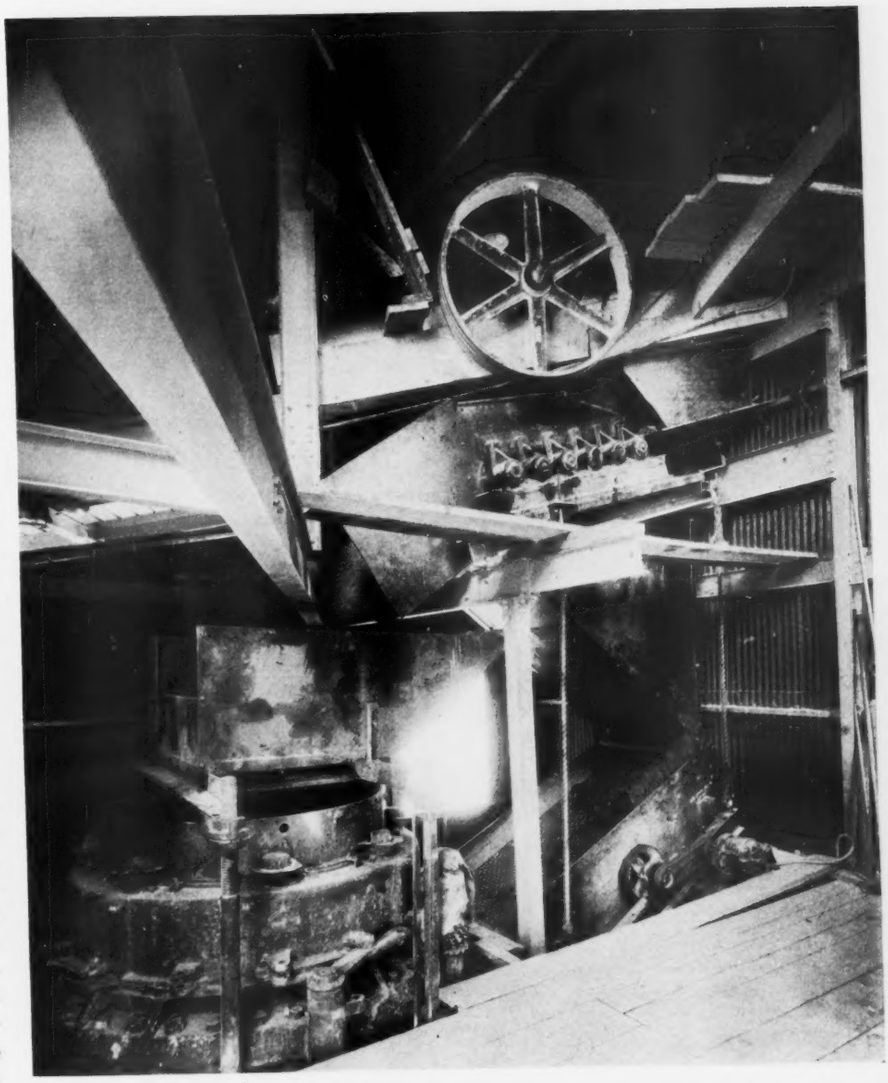
The vibrating screen, in this instance called the "scrubber," is suspended from a steel beam by four 1½-in. manila rope cables. This, according to Mr. Odenbach, is for the purpose of cutting down any tremors to the structure which might occur should the screen be secured in the ordinary way, i. e., bolted to steel or wooden beams. And it has done its job well—there is no evidence of tremblor due to the screens, anywhere. Further, after four months of service, the ropes are still in excellent condition with no signs of unraveling, etc.

In this building, in a space underneath and to one side of the operating equipment, is located control boxes, "stop"

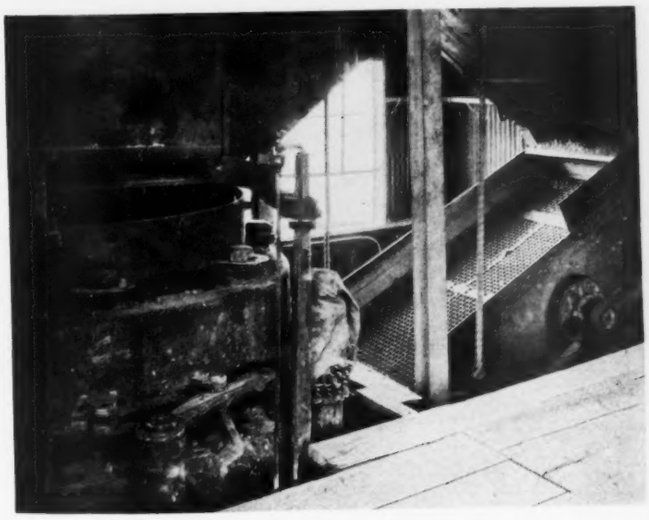
One of the motor trucks dumping quarry stone to the primary crusher

and "start" buttons, switches, etc., for this part of the operation. All this apparatus, as well as the other electrical controls, etc., except the motors, was furnished by the General Electric Co. On the outside of this building, facing the crusher, there is fastened a siren, bell and light, all electrically operated. These are used for signaling the attendant near the crusher who has easy access to the controls. The system is quite simple: in case anything goes wrong in the main screening plant, a stopping of equipment there for any reason, the automatic control at once signals the operator at the primary crusher to stop the *C* conveyor running to the plant. This is by means of the siren, bell, or at night by light, also. There is also an automatic system for stopping the belt; this will be discussed further along. Incidentally, before any equipment is started, the signal warning is given through the same methods.

The discharge of the Symons cone crusher, 2¾ in. and under, joins the material from the first deck of the "scrubber," and both are carried to the main screening plant by the *C* conveyor, a 7-ply, 42-in. United States Rubber Co. belt, 235 ft. centers, driven by a 60-hp. Allis-Chalmers motor and with Texrope. The conveyor gallery, carriage and idlers are identical in construction with the other two conveyors heretofore mentioned. Discharge of this conveyor is to a steel box at the head of the conveyor which feeds the top roll grizzly. At this box is another operating arrangement to control the flow of stone passing to the roll, viz., a safety cutout which stops the conveyor when the box builds up with stone for any reason. This device is simply a solenoid brake attached to the head pulley; the action of this brake has been reversed so that when the current is on, the brakes are in release position and are only set when the tripper in the stone box is raised to touch a contact which throws off the current, cutting off the belt motor and simultaneously causing the siren alarm to sound.



Interior of the scalping plant. Stone from the primary crusher discharges to the roll grizzly above; oversize passes to the crusher and throughs to the screen

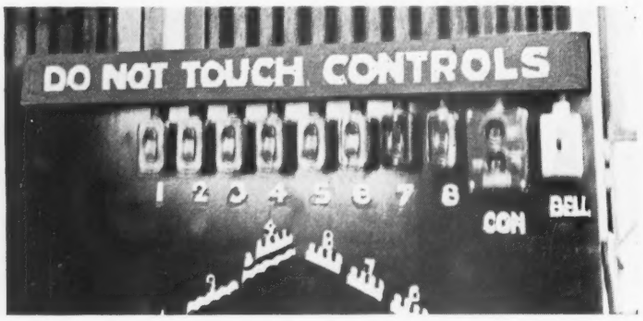


The secondary crusher and vibrating screen called the "scrubber." Note the rope suspension of this screen

Looking down the main conveyor from the top of the sizing plant

Just another little labor-saving device of Mr. Odenbach's!

The main sizing plants rests atop the steel bins, 67 ft. from the ground level. It is entirely enclosed with Robertson corrugated siding. The simplicity of the sizing operation is surprising—chiefly because of the tonnage produced, and the excellent grading afforded by those means. There are no rotary screens, just more roll grizzlies and vibrating screens. The grizzlies are arranged in a descending bank, one atop the other, and likewise is true of the vibrating screens.



Numbered controls for equipment in the main sizing plant

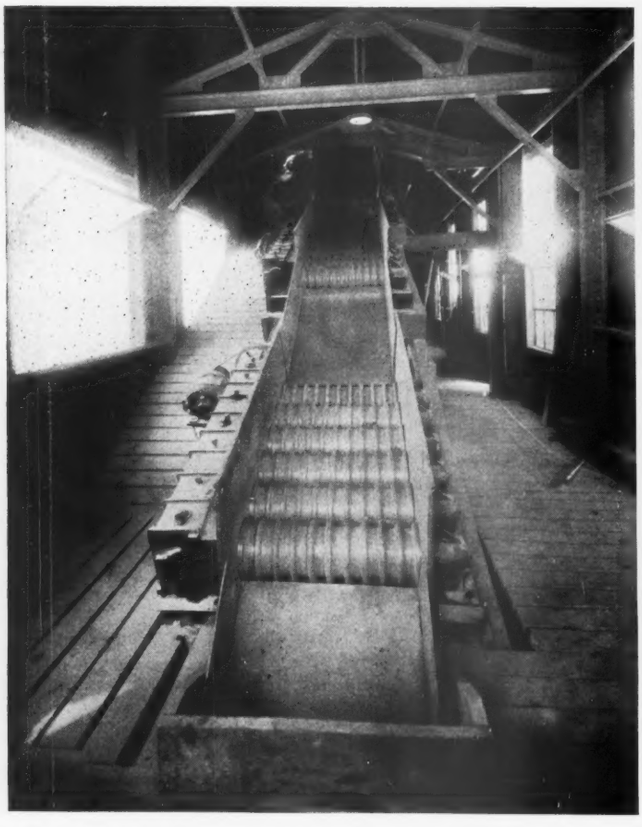
The *C* conveyor discharges to the box feeding the top roll grizzly, designated as No. 8; the rolls are spaced 1½-in. apart, material passing there goes to the No. 4 roll grizzly below and the rejects pass to the No. 7, or first of the sizing roll grizzlies. The No. 3 screen is a Niagara, double-deck, the upper deck having ⅝-in. wire cloth and the lower, ¼-in. wire cloth; material passing the lower deck goes direct to underneath bins, that retained on the upper cloth goes to the No. 2 vibrating screen, also a double-decked Niagara, identical in screen cloth size with the No. 3. The function of this second screen is to insure the removal of the fines, ¼-in. down. The last and lowest vibrating screens, No. 1, in the series, receives the material, ⅝ in. up, which has been retained on the first deck of the Nos. 2 and 3 screens. It is single-deck Niagara, ⅞-in. wire cloth; material passing this goes to underneath bins and rejects go to the other bins below.

The No. 7 grizzly has the same roll spacing as the No. 8 roll grizzly; this is to insure removal of stone, 1½ in.; and it thus becomes reasonably certain that any material going to the No. 6 roll grizzly below has very little if any stone of this size. The No. 6 grizzly has its rolls spaced 2¼ in. apart; rejects go to the No. 5 and throughs to the bin below. The last grizzly, No. 5, sizes stone to 2¾ in., thus the bin to which this drops has material 2¼ to 2¾ in. in it. Rejects, 2¾ in. plus, pass to another bin.

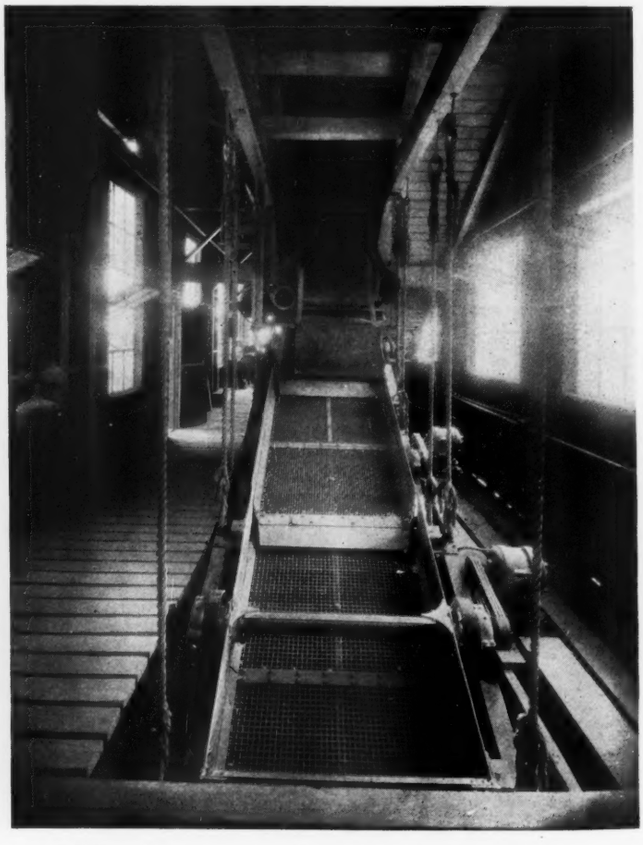
All the grizzlies are of the make described before, 6-roll type, and each is driven as a unit by an Allis-Chalmers 5-hp. motor with Texrope. The vibrating screens are each suspended from steel beams by four 1½-in. manila ropes, as previously mentioned, and each is driven by a 5-hp. Allis-Chalmers motor with Texrope. Controls for this equipment are located on one of the inside walls of the room, as can be seen by the accompanying cut. All numbers designate the screen or roll grizzly and they are started in the order shown: 1, 2, 3, etc., and stopped in the reverse order. Each piece of equipment has its individual starting button and magnetic switches, which latter are of the most recent General Electric Co. make, type CR-7006-D4, equipped with overload resets. Under these conditions the operation becomes as nearly foolproof as possible; everything is simply designated and many precautions taken to stop the equipment if necessary either automatically or by the operator.

Most interesting is the absence of dust in the sizing plant—a feature speaking well for the efficiency of its removal in the primary screening.

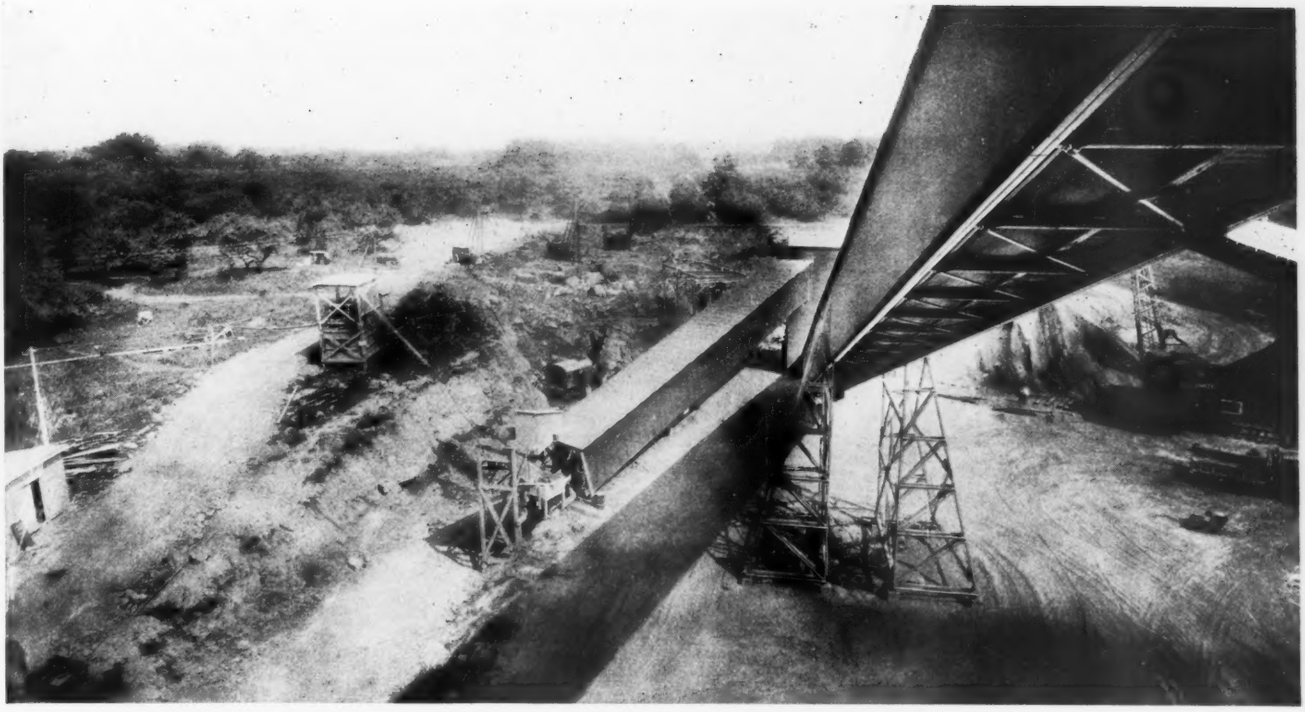
The bin structure is of all-steel frame on steel base resting on concrete piers.



Bank of roll grizzlies for sizing stone, 1-in. plus



Vibrating screens make the finer stone separation



An unusual view of the Penfield plant and quarry taken from a small hill near the sizing plant

It is partitioned off into two parallel sections of seven compartments each. Each compartment is separated from the other by a double wall of steel plate. All sections are tied with steel tie beams. The entire bin construction is of this ¼x½-in. steel plate, firmly bolted in sections to the retaining frame. All stone from the sizing plant drops directly into these bins to the partition designated for it; this feature eliminates any steel or wooden chutes which may wear and cause trouble. The two parallel bin sections are raised up off the ground sufficient to allow trucks for loading, etc., to pass underneath. Each section is equipped with seven unloading gates, one for each bin compartment. One of these sections will eventually serve for railroad car loading, although the standard-gage track underneath the bin is at present used only by the stockpiling car. The other section is for truck outloading; each gate is numbered to correspond to the stone contained in the compartment it serves. The total bin storage capacity is about 2500 tons. The bins and the steel conveyor structure were built by the Genesee Bridge Co., Rochester.

Starting from beneath the bins, the standard-gage track of 90-lb. rail is being extended. On both sides of this track stockpiles of sized stone are maintained. A 25-ton Brownhoist, gasoline, railroad-type crane and clamshell is used for stockpiling, reclaiming, etc. Under the present scheme, the bins unload to 3 50-ton railroad cars which are then hauled away by the Brownhoist crane to the desired location and the material unloaded on both sides of the track by the clamshell. Eventually the track will be extended to connect up with the main line of the New York Central railroad.

All power is purchased at 4200-v. and stepped down to 440-v. by two transformer stations, one of 300-kw. capacity for the shovels, well drills, pump, etc., and the other of 600-kw. capacity for the plant operating equipment. This latter transformer station has been built in such a way that it can be transported to any desired location; the shovel just picks it up and carries it where wanted. All the carrying cables and lead wires are of Rome Wire Co. make.

End view of the bin structure

All the electric motors not previously described are of Allis-Chalmers make, of the new roller-bearing type. The motor schedule follows:

MOTOR SCHEDULE

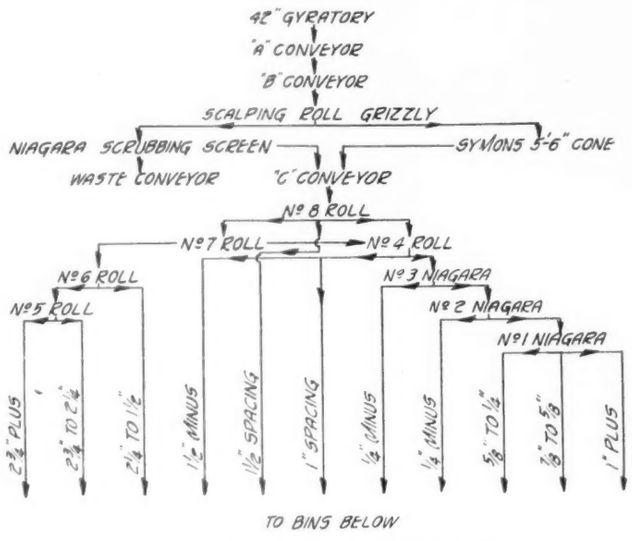
Connected load equipment	Motor hp.	Drive
Marion 490	65	Direct
Air compressor	15	Direct
Well drills (2 @ 15 hp.)	30	Direct
Conveyor "A"	25	Texrope
Conveyor "B"	25	Texrope
Conveyor "C"	60	Texrope
Conveyor (waste)	3	Texrope
Roll grizzlies (6 @ 5 hp.)	30	Texrope
Vibrating screens (4 @ 5 hp.)	20	Texrope
Quarry pump	25	Direct
Quarry pump, 3600 g.p.m.	75	Direct
42-in. gyratory	200	Texrope
No. 5½ Symons	150	Direct
Total	710	

The entire operation, plant and quarry, has been wired for night operation. At the quarry, two Simplex floodlights, each of 1000 c.p., and 5 others of Cross-Hines make of 250 c.p. each are in use. At the present time, a night shift is working getting out stone to meet the demand and to overcome part of the time lost due to establishing a quarry base.

Trucks

All shipments are made by trucks, principally in those owned by the company. There are 45 such trucks in use, divided between the Gates plant and this one, and of this total 35 are Macks. Some of these are of the new model AR-6, 6-wheeled type, designed specifically to carry heavy loads at a good rate of speed. The Dolomite Products Co. is rapidly equipping its trucks with pneu-

matic tires; 20 of the trucks in service already have Lee pneumatic tires, 40x8 and 42x9. Decision to make this change was based on a study of *all* the factors entering into truck operation. It was found that the life of the truck was lengthened, repair bill cut down and speed of service materially advanced by the use of pneumatic tires. When a company, such as the Dolomite Products Co. is engaged in delivering its products, the savings in time is no mean item. And, as Mr. Odenbach put it, "Whatever item adds to operation costs, no matter where it occurs, eventually must show up in the profits." This is a factor often overlooked by the operator who concerns himself so deeply with cutting down manufacturing costs that he is apt to let slide other contributing details, either before or after the processing.



Flow sheet of operations, Penfield plant, Dolomite Products Co.

The quarry truck bodies are of special design, all-steel constructed and especially intended to carry heavy loads. All are of the end-dump type; they are pivoted near the head in a simple manner, their weight keeping them on the chassis frame after return from dumping position. The original 6-wheel chasses have been reinforced with heavy channel-irons.

Auxiliary Buildings

There are but two other buildings, a temporary office and a blacksmith shop which also contains racks for bolts of all sizes, extra parts for equipment, etc. The forge is equipped with a Buffalo Forge Co. fan driven by a ¼-hp. General Electric motor to supply the draft. A Fairbanks platform scale 60,000-lb. capacity is used for truck weighing. It has a platform of reinforced concrete, a rather unusual construction feature which is said to be the first of its kind in the East. Some of the installations at the present are only temporary until the quarry has been developed according to the plans. When this is done and a level quarry floor made at the 47-ft. level, then the crusher will be dropped so that its mouth is about on this level; this will remove the necessity for the quarry trucks climbing an incline. Of course, the *A* conveyor will be shifted to meet this change of conditions. Then the quarry floor will be lowered to the planned 72-ft. depth.

The designed capacity of the new plant is about 500 tons per hour, although it is now only producing about 2000 tons per day. This output will be increased when the expected demand grows and that, judging from activities in the district, will probably be during the next season. Only 19 men, exclusive of those delivering stone to customers, are required for operation. These are divided as follows:

Operation	Men employed
Stripping:	
Shovel	1
Linn tractor trucks	2
Drilling:	
Blast hole drills	2
Blockholing	1
Quarry loading:	
Shovel	1
Trucks	3
Pitman	1
Loading:	
Bin gates	1
Stockpiling (crane)	1
Crushing plant:	
Dumping at gyratory	1
Crusher house	1
Sizing room	1
General:	
Superintendent	1
Mechanic	1
Office (plant)	1
Total	19

John H. Odenbach is president and general manager of the Dolomite Products Co., Harvey N. Clark is general superintendent and Leonard Harris, assistant general superintendent. Archie F. Neely is superintendent of the Penfield plant.

Lime Treated Adobe Soils

AFTER one season of successful experimentation with a lime-sulphur mixture to make the adobe lands of the Cotati lands more productive, the Cotati Land Co., Cotati, Calif., owners of large holdings in the Cotati flats, will next season treat a far larger tract.

According to Fred Keppel, manager of the company, the tests this year have been thoroughly satisfactory on the acre experimental plot with all types of vegetables and melons growing in far greater quantities than ever before.

The experiment was made following the report of university soil experts that the adobe would yield bountifully if treated with lime to counteract acidity. A mixture of 1800 lb. of lime and 200 lb. of sulphur to the acre was recommended by the soil analysts. This was used on the trial plot.

While the recommendation was for the successful raising of lettuce, all types of vegetables were tried with good results. Lettuce appears to be of as good quality and size as any grown in California, while corn, beans, peas, sunflowers, potatoes, pumpkins and Jerusalem artichokes are all thriving on the plot.—*Santa Rosa* (Calif.) *Democrat.*

Slag in General Building

SYMPOSIUM No. 12, of the series issued by the National Slag Association, gives the use of slag concrete aggregates in general building construction. There are several tables showing the tonnage in different classes of construction. They show that in Ohio alone 414,500 tons have been used in the better class of factories, warehouses and office buildings. Three lists which include factories in New England, Pennsylvania and the South account for 256,900 tons, 107,000 tons and 247,000 tons. Office buildings of the better type are listed and account for 297,900 tons.

The body of the bulletin is given to the behavior of slag concrete in withstanding heavy vibration, the hard wear that comes in the bottom of coal and grain bins, and so on. Its advantages in the way of light weight, fire resistance and good bonding qualities are also set forth. One quotation shows that it has been used for practically every use to which concrete is put, including all kinds of bridges and buildings, footings, foundations, fence posts, telegraph poles, floors, roof slabs and the more generally used concrete building units.

Several instances are given in which slag concrete structures had to be wrecked in order that a larger building might occupy the ground, giving a chance to examine the condition of the concrete and reinforcing. In every case the steel came out clean and free from erosion of any kind, and the concrete itself was found to be in perfect condition. This disposes of the old bugaboo, the idea that the steel would be attacked by the sulphur in the slag. In recent years so many examples, from structures that have stood many years of service, have shown that any sulphur present is so combined chemically that it cannot attack the steel that this argument against the use of slag is rarely heard now.

General view of the entire operation at the new plant of the American Aggregates Corp., Indianapolis

Indianapolis Plant of American Aggregates

New Operation Producing 5000 Tons Per Day of Sand and Gravel Is Largest in the District, Shipping by Truck and Rail

IN THE VICINITY of Indianapolis, Ind., there are a number of sand and gravel producers who make shipments by trucks but only one plant that makes rail deliveries. Indianapolis is beginning a 10-year program of railroad elevation and river improvement. Realizing these conditions, the American Aggregates Corp. started construction of a plant late in 1928 to have a capacity of 5000 tons per day of washed sand and gravel. The plant has been completed, is operating on a double shift basis and is making deliveries by both truck and rail. It increased the productive capacity of the district in proportion to the anticipated increase of demand for the coming decade.

The American Aggregates Corp. has obtained a contract from the Indianapolis Union Railway Co. for the building of new fills across the White River basin and for other industrial and connecting line elevations. The amount involved is said to exceed 6,000,000 cu. yd.

The new plant is located at 12th and West Raymond Streets, Indianapolis, Ind., approximately four miles from the center of the city with rail connections on the Indianapolis Union Railway. To make this connection the American Aggregates Corp. had to build a spur one mile long and elevate this trackage so that vehicular traffic could pass under West Raymond street.

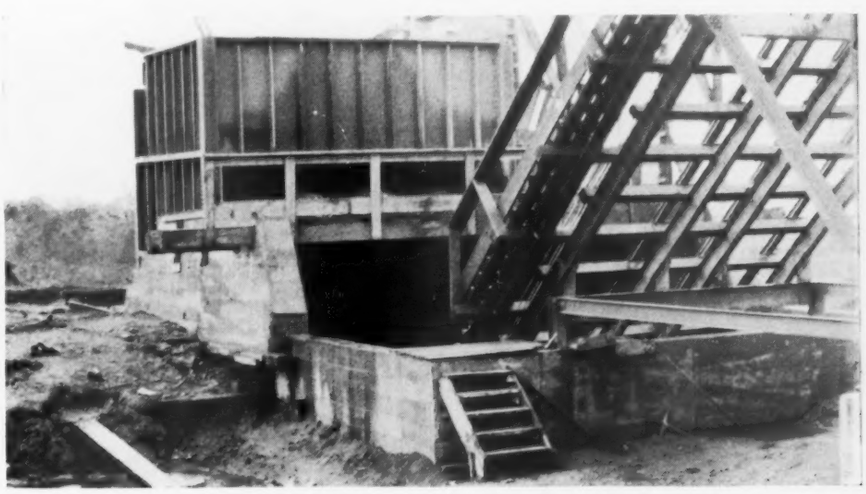
The plant is similar in many respects to the other newer operations of the American Aggregates Corp., that have been described in ROCK PRODUCTS at various times, with some improvements used to advantage at some of their other plants. It was designed by the engineering and operating staff of the American Aggregates Corp., and represents an investment of $1,250,000, which includes the valuation of 325 acres of sand and gravel bearing ground that the company controls at the site of the plant as well as the cost of building and elevating the track to the plant. The operation for one shift will require a total of 25 men.

Before starting construction work on this new plant the company tested the area to a depth of 70 ft. by test pits and from this data found their deposit, like practically every other deposit in the district, contained a high percentage of sand and that the amount of large gravel to be crushed was small. As the amount of sand to be handled was larger than the market requirements the engineers installed a field hopper similar in principle to the ones in use at their Columbus, Ohio, plant. This allows a rough classification to be made in the field, close to the dredge, eliminating the pumping of unwanted sand to the plant.

At present the field hopper is built at the foot of the skipway in such a manner that the two 5-cu. yd. balanced skips can pass directly under the hopper for loading. As the dredge operations are extended away from the plant this hopper will be moved to sites convenient to the dredge and the desirable sand and gravel will be hauled to the foot of the incline in cars. The present field hopper will then be altered to be used solely as a storage pocket ahead of the skips.

The present hopper consists of a receiving bin which is served by the dredge and at the bottom of this hopper are two inclined stationary screens, one mounted about 10 in. above the other one. The top screen has 1-in. round perforations and the bottom, 3/8-in. round. Under the bottom screen is a blank steel plate set at the same inclination as the screens with a gate or opening near the bottom which can be regulated to return any unwanted sand and effluent to the dredge pond. The oversize from the two screens and what flows over the gates in the steel plate join and fall to the hopper serving the skips.

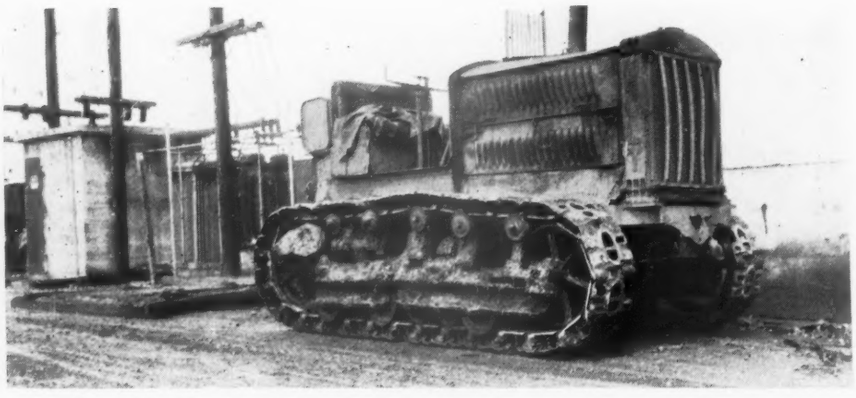
The deposit lies along the west bank of White River and has about four feet of



Feed hopper at the foot of the skipway. The balanced cars pass directly underneath for loading

Stripping with a 5-cu. yd. dragline

The all-steel dredge can dig to 60-ft. depths



A tractor handles the mud mats for the dragline and does other general work about the plant

overburden that is at present being removed by a No. 24, Bucyrus, steam-driven dragline using a 5 cu. yd. bucket. The excavator is mounted on four sets of flanged wheels, each set having four wheels that run on industrial rails spiked to the mud mats. The overburden is used for railroad fill purposes. In addition to this dragline the company has a Pawling and Harnischfeger, No. 206, gasoline driven 1-cu. yd. dragline excavator for misceallaneous work.

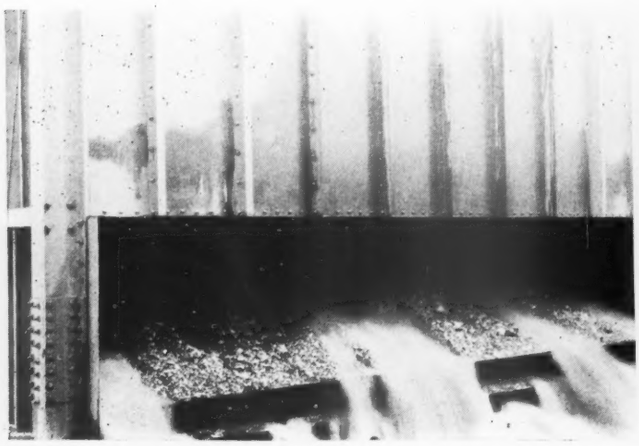
Two 40-ton steam locomotives are used to haul the overburden and any excess sand from the plant into the Union Railway fills. Both Western 16-yd., side-dump cars and 50-ton, twin-hopper cars are employed. At the dumps a Nordberg track shifter and a Western, standard-gage spreader car are used.

The washing plant has a floor area of 90 ft. by 36 ft. with an offset of 20 ft. by 52 ft. and rises 86 ft., 9 in. to the top floor. The skipway is constructed for a horizontal movement of approximately 125 ft. and a vertical lift of 100 ft.; it is 192 ft. from the bottom of the skip pocket to the top of sheave. There are 10 bins having a total capacity of 4000 tons.

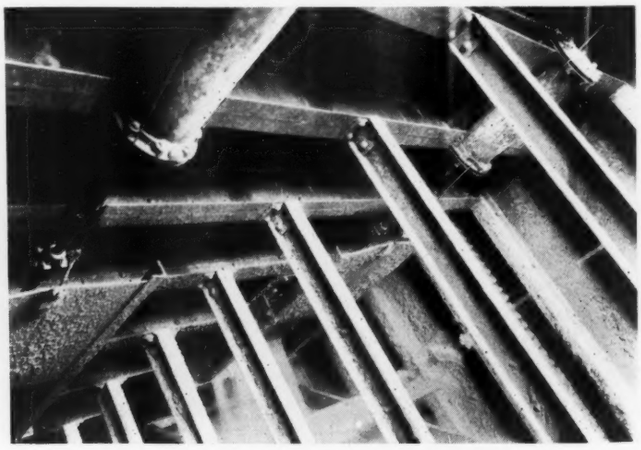
The plant is of steel construction excepting the side walls of the bins, which are of wood. The entire plant is covered with corrugated steel. Practically all of the machinery and equipment used in the plant was manufactured in the company's own shop, the Greenville Manufacturing Works, at Greenville, Ohio, including the screens, elevators, conveyors, sand boxes, skip hoist, skip cars, dredge hoist, dredge boat, driving machinery, bin gates, pontoons, etc.

The Dredge

The dredge is of steel construction of a type peculiar to the American Aggregates Corp., with which it has had much success. It is 84 ft. long by 26 ft. wide with a well 12 ft. wide and 28 ft. long for the ladder. The boat mounts a 15-in. American Manganese Steel Co. dredge pump, direct-connected to a 400-hp., 4600-volt motor. A 4-in. centrifugal pump of 500 g.p.m. capacity at 110 ft. head supplies water for priming



Inclined stationary screens at the field hopper to remove unwanted fines



Air-controlled gates under the field hopper for loading cars and skips

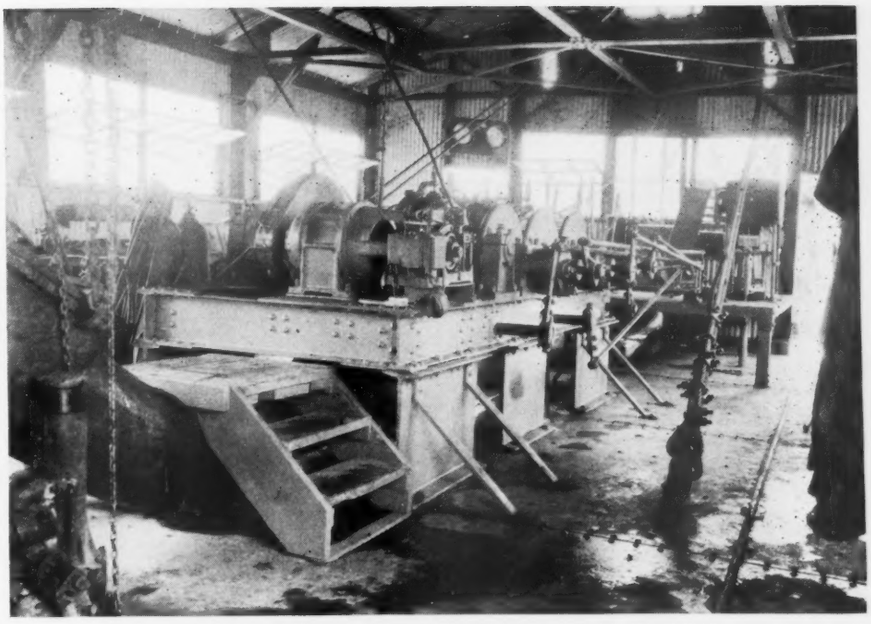
purposes; this is driven by a 50-hp. motor.

The digging ladder is 66 ft. long and can dig to a depth of 60 feet. and any small seams of clay that may be encountered can be readily penetrated by the cutter head mounted at the suction pipe opening.

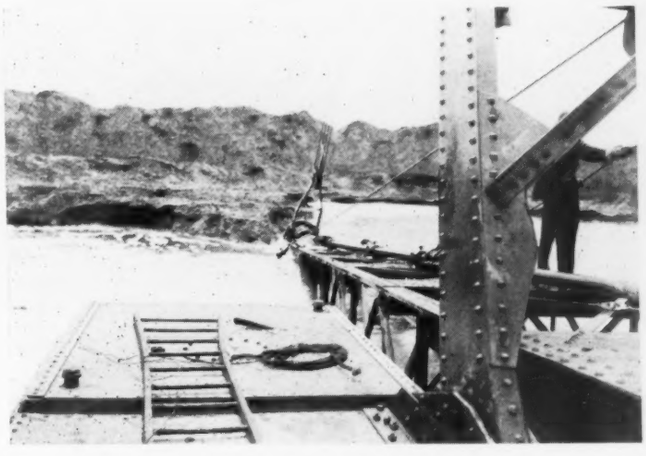
The five-drum dredge hoist, manufactured by the Greenville Manufacturing Works, mounts a 30-hp. motor equipped with solenoid brake. A 25-hp. motor drives the cutter head. The dredge equipment proper is housed in a steel frame deck house covered with corrugated steel.

Material Delivered to Field Hopper

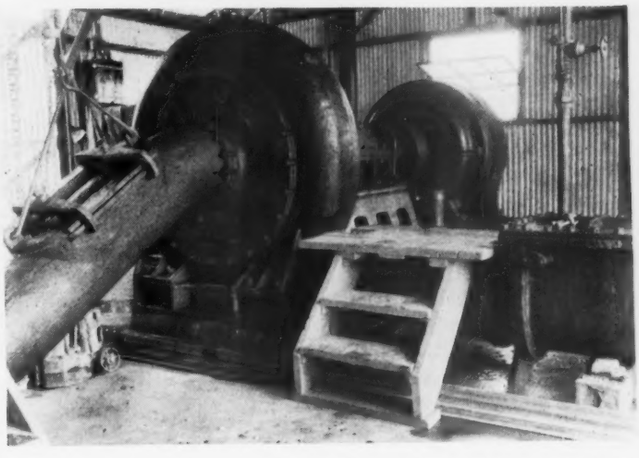
The pump delivers the material to the field hopper, and is drawn into skips through gates controlled by air pistons. Each gate consists of a steel plate in a suitable guide with a safety gate directly below the air-operated one so that in the event that the upper one becomes stuck when closing the second gate can be quickly dropped into place. As the material has a high water content at this point precautions were taken to provide a gate that would function when wanted and not overflow the skips being loaded. The field hopper leaks considerable water into the pit under the field hopper and this is removed by a 4-in. Allis-Chalmers centrifugal pump, direct-connected to a 10-hp. induction motor. This water is simply pumped back to the dredge pit.



Interior of the dredge, showing the hoist and control platform; the suction pipe runs underneath the platform

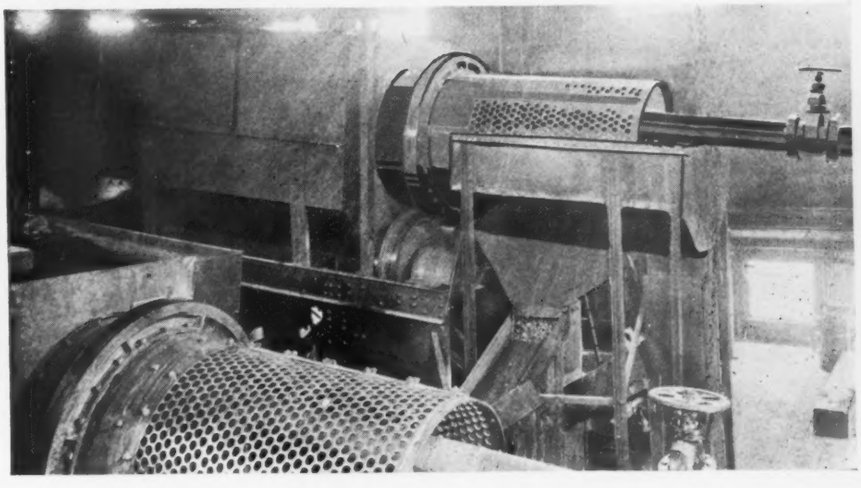


The dredge cutter elevated to the surface of the pond; the cutter head is mounted at the suction pipe opening

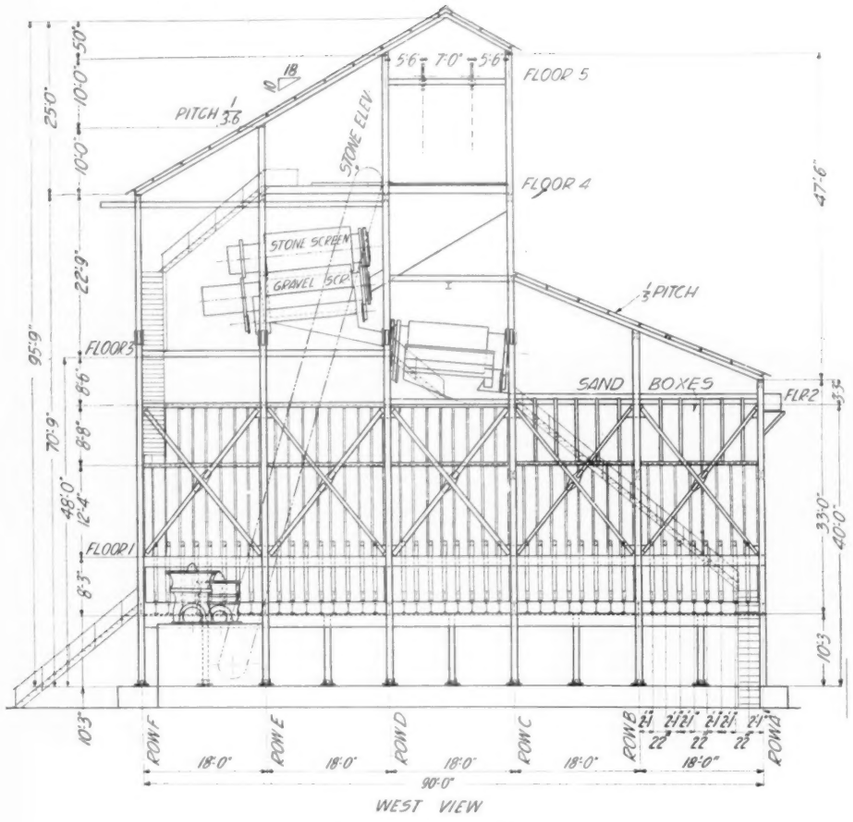


The 15-in. suction pump is direct-connected to a 400-hp., 4600-v. electric motor

The two balanced skips, holding 5 cu. yd. each, are pulled up the skipway by a Greenville single-drum hoist operated by a 150-hp. motor. This hoist is equipped with a solenoid brake. The skips are discharged to a hopper serving the two rotary gravel screens. These screens are equipped with double jackets. The screens are identical in every way. Each has a 4-ft. diameter by 25-ft. long inner barrel with 1½-in. round perforations, a middle jacket 5 ft. 6 in. in diameter by 13 ft. 6 in. long with ¾-in. perforations and an outer jacket 6 ft. 6 in. in



One of the rotary screens (foreground) and the crushed stone screen in the background



Cross-sectional elevation of the screening plant

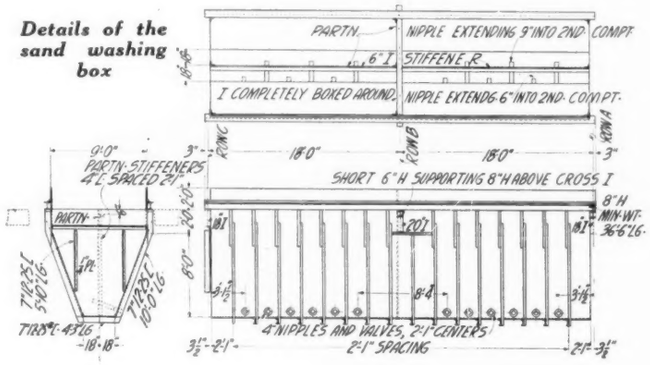
diameter by 12 ft. 6 in. long with ¼x¾-in. slots. A 5-ft. over-hang on the inner barrel has 1¾-in. perforations. The oversize from the inner barrel can be chuted to the crushers as well as the minus 1¾-in. material from the end sections or can be chuted to bins in case the market calls for this material. The amount of plus 1¾-in. material is not over 10% of the total gravel produced so that crushing is not a problem at this plant.

The gravel from the middle jacket and that from the outer can be diverted over vibrating screens, the upper decks of which are equipped with ½-in. openings and the lower with ¼-in. cloth. Oversize from either deck is chuted to the bins directly below the screening and washing equipment. Under one of the rotary screens a Simplicity vibrating screen is used and under the other a Hum-mer, both having the same screening area, that is, 3 ft. by 6 ft.

The sand from the outer jacket of the gravel screens flows to two double-jacketed sand screens. These screens are 48-in. in diameter and have an outer jacket of 1/10-inch wire cloth with the main barrel of ¼-in. The oversize from the sand screen consisting of pea-size gravel is chuted to bins and the sand flows to manually operated settling tanks where concrete and mason's sands are made. More will be said about these classifiers later.

The oversize from the two gravel screens is chuted to either a No. 5 or No. 4 McCully gyratory or to both these crushers; the discharge products join at the boot of a bucket elevator that delivers the crushed stone to a stone screen installed especially to handle that product. This screen has an inner barrel of 1¼-in. round perforations, and two jackets, the middle jacket having ¾-in. round perforations and the outer ¼-in. The oversize from the end of the crushed stone screen is chuted to a 36-in. Symons disc crusher, the discharge of which joins that of the two McCully crushers at the boot of the bucket elevator. The various sized gravels produced are chuted to bins and no attempt is made to keep the crushed gravel from the regular run material, principally because the amount of this crushed material is small, although it could be kept separate if desired. The sizes regularly made are ¾-in., 1¼-in., 1¾-in., No. 3 sand (mason's) and No. 4 sand (concrete).

Details of the sand washing box



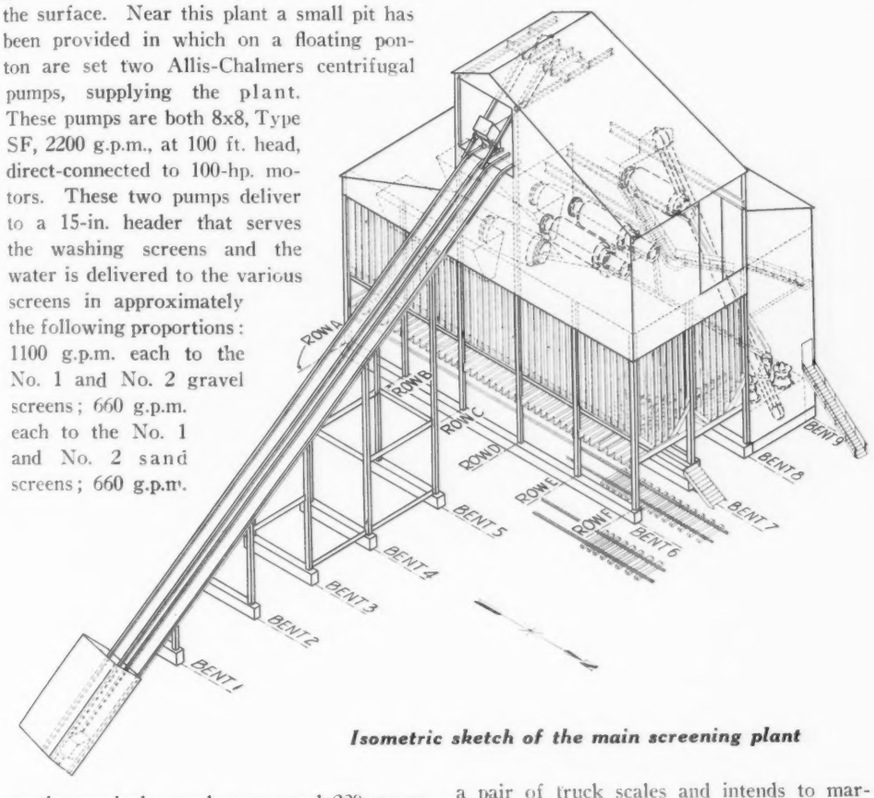
Rear view of the Indianapolis plant, American Aggregates Corp.

The sand from the outer jackets of the sand screens and from the jacket of the crushed gravel screen flows by gravity to hopper bottomed tanks placed parallel to each other. The tanks have a total length of 36 ft. and are divided into two sections, each of 18 ft. The width is 9 ft. at the top and 2 ft. at the bottom. At 2-ft. centers and near the bottom, there is bolted a 4-in. flange to which is fitted a plunger or gate for removal of the accumulated sands, the gates being opened and closed by suitable levers grouped at a convenient location on the operator's platform. Concrete sand is settled in the receiving end of the classifier, the mason's sands in the other end and

means are provided for by-passing the overflow from the concrete sand sections should it be desirable.

Water Supply

Water supply for plants in the Indianapolis territory is not a serious problem, as ground water level is only a few feet below the surface. Near this plant a small pit has been provided in which on a floating ponton are set two Allis-Chalmers centrifugal pumps, supplying the plant. These pumps are both 8x8, Type SF, 2200 g.p.m., at 100 ft. head, direct-connected to 100-hp. motors. These two pumps deliver to a 15-in. header that serves the washing screens and the water is delivered to the various screens in approximately the following proportions: 1100 g.p.m. each to the No. 1 and No. 2 gravel screens; 660 g.p.m. each to the No. 1 and No. 2 sand screens; 660 g.p.m.



Isometric sketch of the main screening plant

to the crushed gravel screen and 220 g.p.m. to the vibrating screens, etc.

As the pond from which the water supply is drawn is not large enough to provide all the water needed, a smaller temporary pump, an 8-in. centrifugal, has been provided at a second pit nearby.

Specifications for sand and gravel in this territory are very strict and the state highway commission maintains an inspector at this plant and at the Granite Sand and Gravel Co. plant which was purchased by the American Aggregates Corp. in July, 1928.

Sand and gravel for local use is, in this district, quoted on the basis of cu. ft., but the American Aggregates Corp. is installing a pair of truck scales and intends to market its product on a tonnage basis. Ballast for railroad work is sold by the ton. Incidentally these are the first track scales to be installed at a sand and gravel plant in Indianapolis.

Officers of the American Aggregates Corp. are: F. D. Coppock, president; C. E. Patty, vice-president and general manager; Joe F. Coppock, assistant general manager in charge of operations, and J. C. Patty, chief engineer. Chesliegh Gray is district manager for Indiana, and F. E. Hauk is manager of the Indianapolis plant.

MOTOR SCHEDULE

Drives	Hp.	Make and type of drive
Dredge pump	400	Allis-Chalmers, dir. con.
Primer pump	30	Allis-Chalmers, dir. con.
5-drum dredge hoist	30	Allis-Chalmers, gear red.
Dredge cutter	25	Allis-Chalmers, gear red.
Skip hoist	150	Gen. Elec., gear red.
Sump pump under field hopper	10	Allis-Chalmers, dir. con.
Gravel screen No. 1	25	Crocker, Texrope
Gravel screen No. 2	25	Wagner, Texrope
Sand screen No. 1	15	Gen. Elec., Texrope
Sand screen No. 2	20	Gen. Elec., Texrope
Crushed stone screen	20	Robbins & Myers, Texrope
Disc crusher	50	Allis-Chalmers, Texrope and belts
Gyratory No. 4	50	Gen. Elec., Texrope
Gyratory No. 5	50	Howell, Texrope
Vibrating screens	10	
No. 1 pump	100	Allis-Chalmers, dir. con.
No. 2 pump	100	Allis-Chalmers, dir. con.
No. 3 pump	25	
Compressor	10	General Electric
Crushed stone elevator	25	Gen. Elec., Texrope
Water pump for drag excavator	6	Fairbanks-Morse gas engine, belted
Shop	5	General Electric
Total horsepower	1181	

U. S. Gypsum and Johns-Manville Form Distribution Affiliation with Insulite Co.

BOTH the United States Gypsum Co. of Chicago, and the Johns-Manville Corp. confirmed the fact that important agreements had been entered into with the Insulite Co. of Minneapolis, a subsidiary of the Backus-Brooks Co., according to the *New York* (N. Y.) *Herald-Tribune.*

Insulite Co. will manufacture insulated lumber for the Johns-Manville Co. west of the Allegheny Mountains, which will be distributed by Johns-Manville. The distribution organizations of United States Gypsum Co. and Insulite will be affiliated, but Johns-Manville will have no connection with the United States Gypsum except as it has a manufacturing agreement with Insulite, which in turn has a distributing agreement with United States Gypsum.

The competitive status between Johns-Manville and the United States Gypsum will not be changed, it was pointed out. Any impression to that effect was forestalled by Loius H. Brown, president of Johns-Manville. An interpretation of the deal as a merger was also denied by Mr. Brown.

In order to take care of the large amount of new production made necessary by its affiliation with Johns-Manville Corp. the Insulite Co. is embarking an a program of manufacturing expansion which will necessitate the expenditure of many millions.

The company through its parent company, the Backus-Brooks Co., is one of the most varied industrial units in the country, owning railroads, hydro-electric power plants, thousands of acres of timber land, pulp and paper mills and mines.

Through its agreement with United States Gypsum its distribution system is virtually doubled, a feature which also applies to United States Gypsum Co.

The Insulite company has also completed plans for European expansion and will shortly began the erection of a large factory in Europe.

Cumberland Company Acquires Richardson Properties

TRANSFER of the property of the Richardson Sand & Gravel Co., located on the Cumberland river at the foot of Fatherland street in East Nashville, Tenn., by Henry E. Richardson, owner, to the Cumberland River Sand Co., a newly organized concern, is reported in the *Nashville* (Tenn.) *Tennessean.*

The sale includes the entire plant with properties used by the sand and gravel company, with a sale price of $30,000 set on the real estate and a like sum on the personal property.

Fred B. Franks Takes Option on Bath, Penn., Deposits

FRED B. FRANKS is reported to have taken options on three farms along the Bath-Shoenersville road on which, it is said, he will erect a modern portland cement mill. The acreage of the three farms is about 600.

Mr. Franks had charge of the erection of two plants, the Keystone Portland at Bath, Penn., and the other, the Sandts Eddy plant. He also was for many years superintendent and general manager of the Bath Portland plant, now a Lehigh Portland Cement Co. subsidiary.—*Bath* (Penn.) *Times.*

Design of Sand and Gravel Washing and Screening Plants

Part VI—Distribution—Mixing—Storing—Loading

By Frank M. Welch
Chief Engineer, American Aggregates Corp., Greenville, Ohio

PARTS I TO V of this series have been published in alternate issues of ROCK PRODUCTS, beginning with the April 27, 1929.

Storing—Loading

Reference has been made to the grits, pea gravel, shot, coarse sand, fine gravel or whatever name each community may have for the surplus material ranging from ½, ⅜ or ¼ in. down to ⅛ or 1/12 in., which prevails in so many markets. A large per cent. of otherwise profit is lost in many operations in the wasting or disposing of this surplus. For that reason serious consideration must be given to the finding of all possible markets for this commodity. Personally I have always been at a loss to see why this material should go begging. When mixed with fine sand it makes the best gravel road repair material that can be had, and I can see no reason why large markets should not be developed for it, not only for county roads but also for the unpaved city streets. Apparently however, there is either a surplus after these demands have been fulfilled or else a universally grave oversight has occurred throughout the army of salesmen who are selling material and promoting the use of gravel and sand in the present day's most thriving industry of road building and maintenance.

In our own organization we have two large concrete products plants. Although these plants have proven profitable investments, neither of them would ever have been started had we not been in need of an outlet for our surplus fine material. I am sorry to say however that I have seen plenty of this material sold for the freight, given away or thrown back into the pit. I am confident that with proper promotion, propaganda and education of public officials, many thousands of cars of this material which has cost money to waste, could have been sold at a handsome profit.

In the design of a sand and gravel washing plant, proper and efficient distribution is a feature that is often neglected. In plants where little or no bin storage is desired, the problem of distribution is not so difficult. However if large storage is desirable, the screens and spouts should be arranged not only to fill all the bins, but a system of distribution should be planned whereby different grades can be stored in the same bins and the same grades in remote bins. Such flexibility permits maximum utilization of all bins regardless of varying pit and shipping conditions, and very frequently avoids a plant shutdown awaiting the emptying of one or more bins. It furthermore makes it possible to produce almost any desired mixture of material which the market may demand.

Where the triple-jacketed screen is used, the grades are produced at a central point, which permits all or part of any grade to be mixed with any other and spouted to any bin which happens to be empty. Fly-valves arranged near the

Richmond, Ind., plant, American Aggregates Corp.—a 2-track timber-constructed plant serving traction line and trucks. Capacity is about 30 cars per day

Loading and storage tracks at the Brighton, Mich., plant, American Aggregates Corp.

tops of the various spouts furnish flexibility with much less waste of time than is required in changing screen sections.

Although distributing spouts are often made of steel, it has been found very advantageous to construct them of wood, thereby facilitating alterations. The bottoms, and 4 to 6 in. of the sides, should be metal lined not only for protection but to eliminate friction.

Chutes handling coarse gravel of even grade should slope about 7 in. to the foot; mixed and crushed material 8 in. to 9 in.; raw material containing sand, 9 in. to 10 in. The slope of spouts conveying sand must be determined by the amount of water flowing with the sand. Where it is found desirable to install a spout flatter than material will slide on readily, a round bottom will often solve the problem.

Mixing

In most localities there are markets for certain grades of mixed material, that is to say, the markets demand proportionate grading of some of the various standard sizes of both sand and gravel which the plant makes. A great many of such mixtures are produced by bringing spouts together from two or more bins, containing the grades to be mixed, and feeding them through a common spout into the car or truck. By all means, these should meet in a common spout or at least load at the same point, to insure thorough mixing. At other plants, more accurate proportioning is attempted by feeders located under respective bin gates, feeding the material uniformly on to a loading conveyor. Still others have acquired even more accuracy by using automatic weighing machines at these gates, such as the "Poidometer."

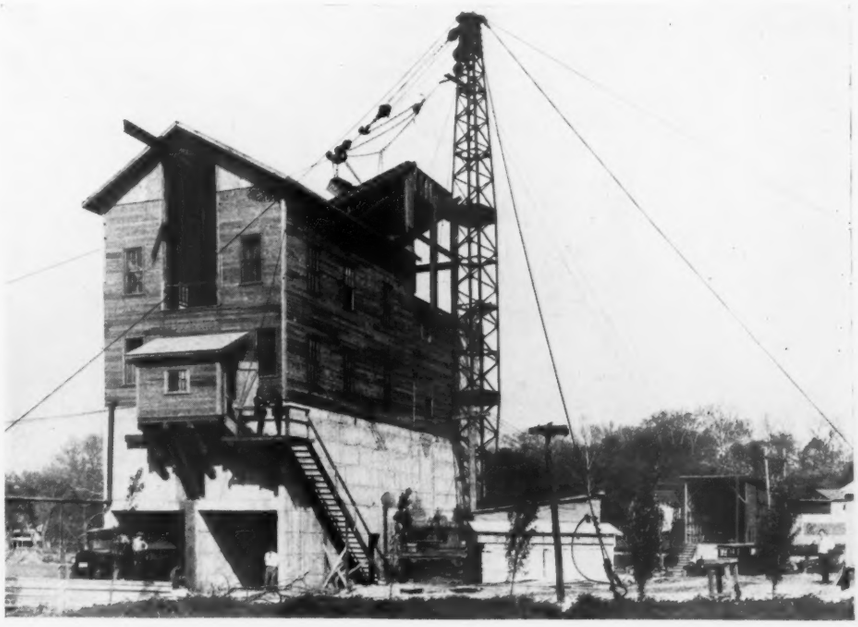
Of course truck loading bins have for years been employing batch boxes, but this equipment is more common under local trade bins. Any of the automatic feeding and accurate mixing devices involve expense in first cost and operation and an increased price should be obtained for such product to justify the added cost of loading.

In our plants, where we screen and wash by means of the triple-jacketed revolving screens, we produce most any mixture in any proportion by means of butterfly valves located in the outlet to the steel gathering hoppers underneath the screens.

Storing—Loading

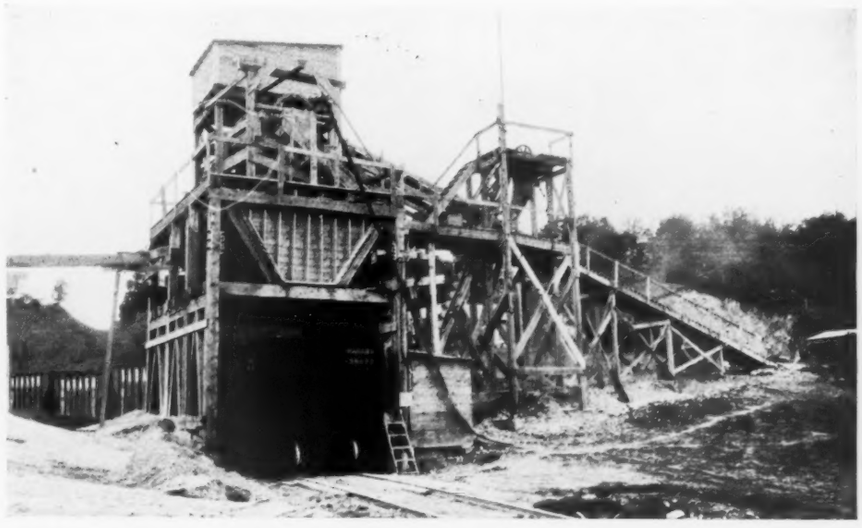
The amount of bin storage with which it is advisable to equip the average plant is an open question with many operators. At some large plants where three or four loading tracks are employed, no bin storage whatever is provided, except small centering hoppers large enough to permit the shifting of cars without spillage. Other plants have storage room for one, two or three carloads of each grade produced, while still others provide for a total storage of 75 to 80 cars. The greater storage acts as an equalizer between temporary plant shutdowns and car shortages. In large installations the eliminations of delays amounting to an hour or two a day will pay the interest upon the cost of fairly extensive bins. Such bins should be constructed of concrete or steel or their life will be comparatively short and the investment a poor one after all.

Rather than install such expensive bin facilities ground storage is often resorted to as an auxiliary to the small bins under the screens. If ground storage to any great extent is made possible, an overhead belt conveyor, extending from the screens or from the bins, over the adjacent yard is necessary. This conveyor is equipped with one of the several types of trippers, which discharges the various grades at any desired point underneath. The material can then be reclaimed by a clamshell or other type of excavator and loaded direct into cars, trucks or wagons. The more modern ground storage plants are equipped with one or two belt conveyors installed in a tunnel underneath the pile. Gates at about 10 ft. intervals in the roof of the tunnel feed on to the belt which discharges the material either direct into cars or into loading bins.



A modern small plant serving motor truck trade only. The bins are of concrete and timber construction (J. N. Dugan Sand and Gravel Co., Cincinnati, Ohio)

Regardless of the capacity and efficiency of the excavating, elevating, crush-



Inexpensive 10-car plant with single loading track (Benzieco Gravel Co., Buelah, Mich.)

ing, screening and washing equipment, the entire operation is handicapped unless adequate loading facilities are provided. Ample track room for both empty and loaded cars is of first importance. The amount of trackage necessary is determined by the daily capacity of the plant and by the frequency of switching services rendered by the railroad, which serves them. If switching is done but once a day, both the empty tracks and loaded tracks must have room for a day's run of cars each. If switching is done twice a day, less track room will be necessary.

The customary layout shows the empty tracks, connected to the main line at the upper end of the plant yards and extending on a 1% to 1½% grade to the plant. This empty car storage consists of one, two or three tracks, according to the number of loading tracks under the plant. From the plant the track or tracks continue on the same grade gradually decreasing until they are level at the extreme lower end of the loaded car storage, where they again connect with the main line. A run-around track which permits a locomotive to pass the plant without interfering with the loading, is almost indispensable in a plant of size. Very often, local conditions or topography prevent connections to the main track at both ends, which necessitates more or less variation from the above plan.

Moderate priced 20-car plant of all-timber construction to fit old tracks and foundation (Crescent Gravel Co., Hersey, Mich.)

The question of the comparative merits of side-bin and under-bin loading has been the subject of much discussion. There is no doubt but that each has its advantages and disadvantages. The leading large capacity plants of the country load underneath their bins. With this method the effective bin capacity is greater, and more than two loading tracks may be employed. If only two tracks are utilized, the gates for both tracks can be handled by one man. The principal disadvantage of this arrangement is the continuous leakage of water underneath the bins, which makes loading a very undesirable job. This leakage, however, has been greatly reduced by various drainage and spouting devices. With the side loading arrangement, especially in small plants, the run-around track can often be eliminated.

Side-bin loading out is accomplished through side-bin gates and hinged loading chutes. Hinged chutes are counterweighted sufficiently to hold them up against the side of the bin when not in use, to permit cars or engines to pass.

Like side-bin gates, the simplest and easiest bin-bottom gate to operate is the undercut type. This type, however, is not universally used where the cars are loaded underneath the bins because of the headroom required. A foot or more of clearance required above the loading tracks, can be saved by installing sliding gates. Sliding gates are very often operated with great difficulty and only those of very careful design are really efficient. For use in our plants we have our own patterns for cast iron gate frames and our own design of slides and operating levers, accurately and substantially designed to prevent clogging, sticking, cramping or breaking. On either design of plant the gates are best controlled from a platform or walkway attached to the bin posts about six or seven feet above the top of the loading tracks from which the operator can easily watch the progress of the loading and keep a check on the quality.

The two types of plant, employing side and bottom loading have little advantage over each other from the viewpoint of construction cost. Although the side loading plant represents much waste bin volume below the loading line and extra sides and partitions which add no capacity to the bins, yet the fact that the material necessary to construct a heavy floor is saved, counteracts the other waste.

(To be continued)

Silica as a Refractory Material

SILICA is abundant and cheap, thus meeting one of the fundamental requirements of a good refractory material, according to R. B. Sosman, in a current issue of *Iron Age*. However, Mr. Sosman continues, it exhibits several limiting weaknesses, namely —low melting point (about 1713 deg. C.), irregular thermal expansion and an activity in slagging with other oxides.

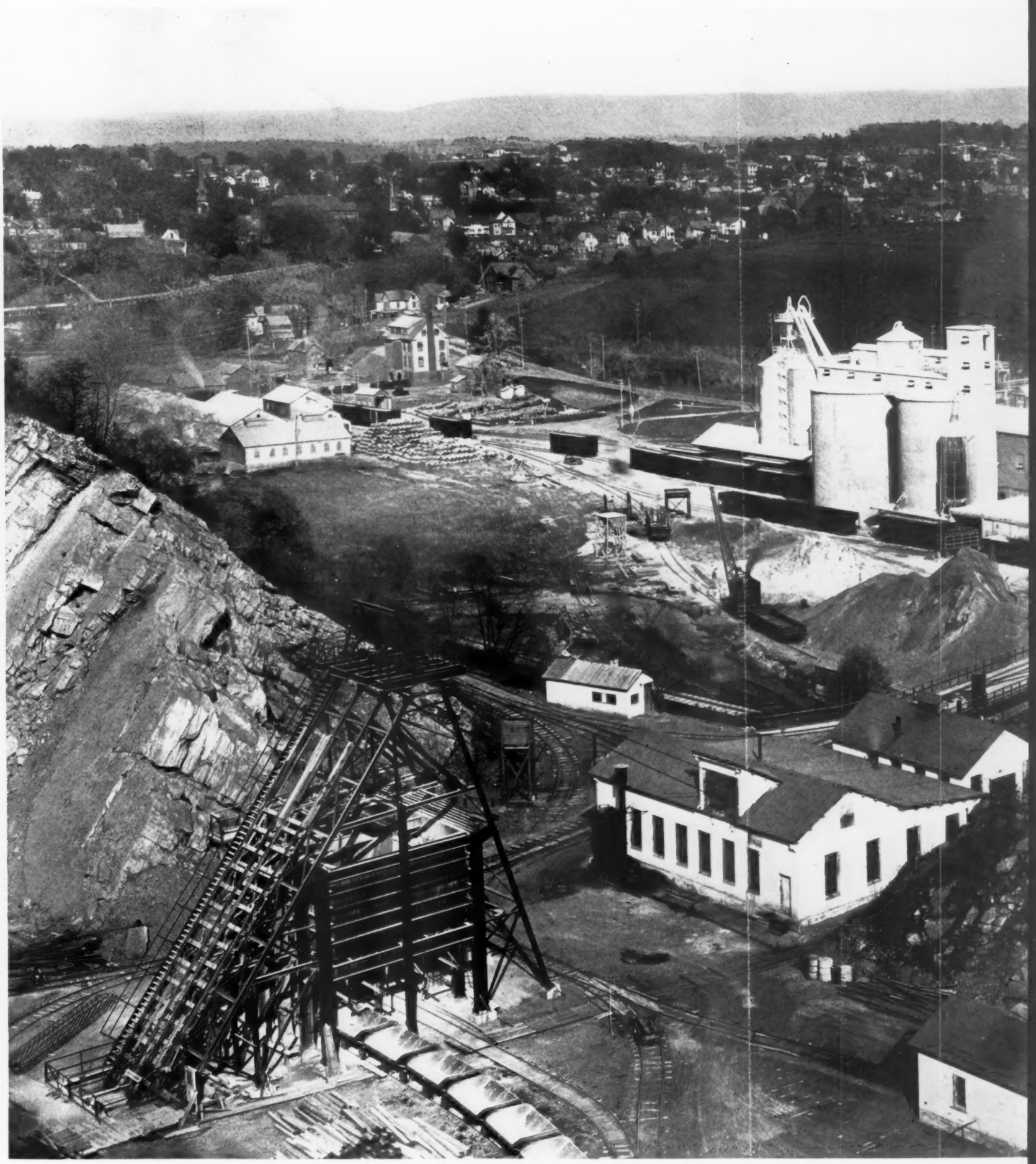
The above limitations can in some instances be improved by a modified treatment of the silica, but in the case of low melting point nothing can be done, for any admixtures would only lower the temperature at which it will liquefy. About one-third of the brick in the open-hearth furnaces are of silica and for this type there is no real substitute.

American Lime and Stone Co. Plant at Bellefonte, Penn.

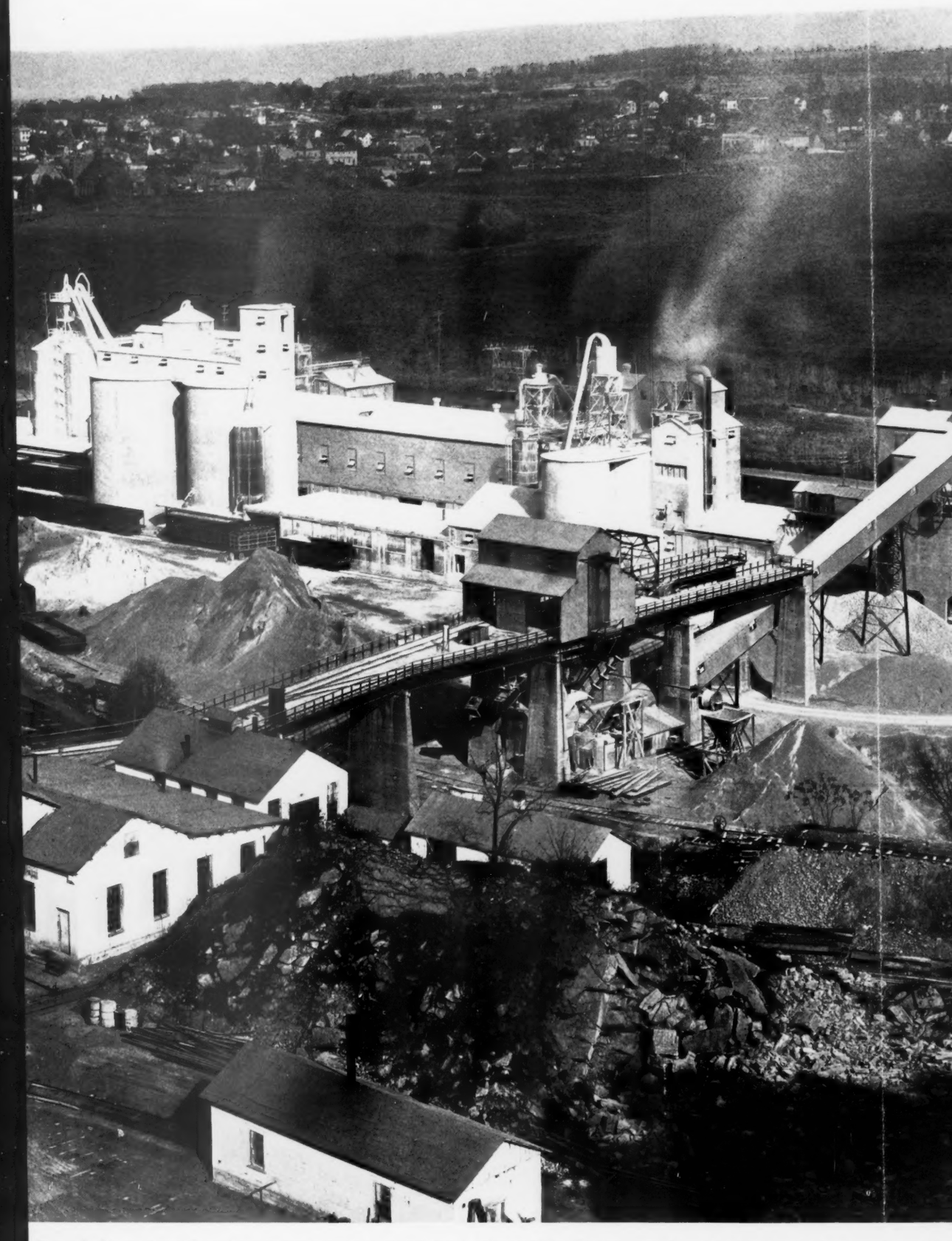
ONE of the largest and most interesting lime plants in the world is that of the American Lime and Stone Co. at Bellefonte, Penn. A recent view of this plant is shown in the insert in this issue of Rock Products. A description of the plant at the time is was built was published in Rock Products, June 17, 1922, and an article on the mining operation in Rock Products, June 3, 1922.

For several years after the underground mining operations were begun electric storage-battery locomotives were used for haulage, but recently on account of the large tonnage and longer hauls electric trolley locomotives were installed. The original 2½-ton side-dump quarry cars were hauled in trains of 10 to 15 cars. These have been replaced with new automatic side-dump cars of the Granby type, having a capacity of 3 cu. yd. or more each, and equipped with Timken roller bearings and automatic couplers. Parts of the drifts were double-tracked and as many of the new cars were handled per train as of the old.

Numerous other improvements were made in the mine and plant, including the installation of a 250-hp. motor on the main shaft hoist, replacing a 100-hp. motor. The mine and plant as it is today is one of the best, if not the best, in the limestone industry.



Plant of the American Lime and Stone Co., Bellefonte, Penn.—One of the most modern lime-manufact



One of the most modern lime-manufacturing operations in the world. Entrance to the mine is shown at the extreme lef

xtreme left

New Plant of the Atlas Portland Cement Co. (of Texas)

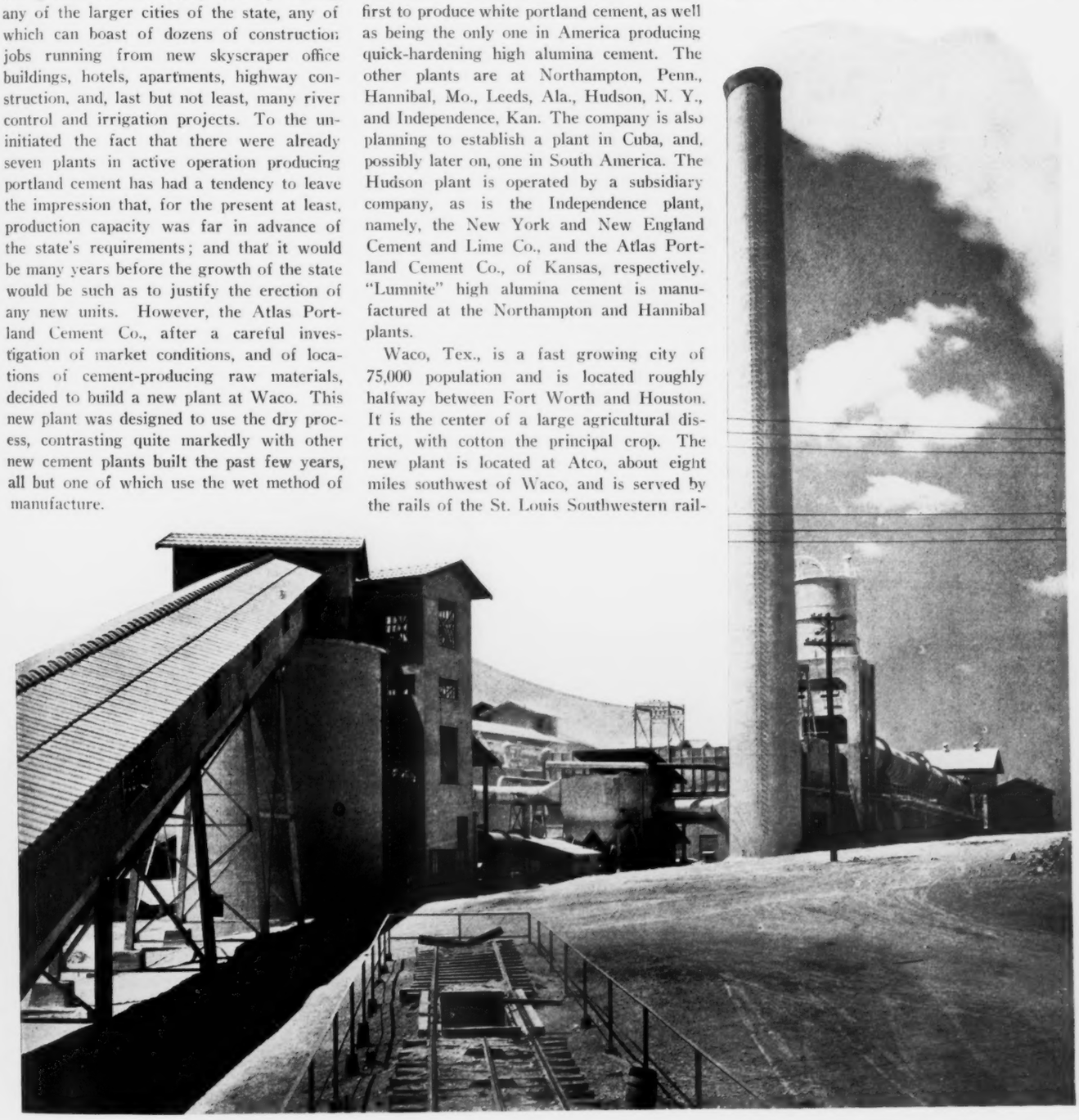
The Latest of All Dry-Process Plants

INDUSTRIALLY, the state of Texas is making rapid strides, placing it in the fore ranks of the new South. Evidences of this growth can be readily seen by visiting any of the larger cities of the state, any of which can boast of dozens of construction jobs running from new skyscraper office buildings, hotels, apartments, highway construction, and, last but not least, many river control and irrigation projects. To the uninitiated the fact that there were already seven plants in active operation producing portland cement has had a tendency to leave the impression that, for the present at least, production capacity was far in advance of the state's requirements; and that it would be many years before the growth of the state would be such as to justify the erection of any new units. However, the Atlas Portland Cement Co., after a careful investigation of market conditions, and of locations of cement-producing raw materials, decided to build a new plant at Waco. This new plant was designed to use the dry process, contrasting quite markedly with other new cement plants built the past few years, all but one of which use the wet method of manufacture.

The Atlas Portland Cement Co., with offices at 25 Broadway, New York City, is perhaps as well known as any cement company in the world, since it was one of the first to produce white portland cement, as well as being the only one in America producing quick-hardening high alumina cement. The other plants are at Northampton, Penn., Hannibal, Mo., Leeds, Ala., Hudson, N. Y., and Independence, Kan. The company is also planning to establish a plant in Cuba, and, possibly later on, one in South America. The Hudson plant is operated by a subsidiary company, as is the Independence plant, namely, the New York and New England Cement and Lime Co., and the Atlas Portland Cement Co., of Kansas, respectively. "Lumnite" high alumina cement is manufactured at the Northampton and Hannibal plants.

Waco, Tex., is a fast growing city of 75,000 population and is located roughly halfway between Fort Worth and Houston. It is the center of a large agricultural district, with cotton the principal crop. The new plant is located at Atco, about eight miles southwest of Waco, and is served by the rails of the St. Louis Southwestern railroad, affording ample shipping facilities to the larger cities that surround Waco.

At the site chosen for the erection of the plant, the Austin chalks, used as a source



Atlas Portland Cement Co.'s new plant at Waco, Tex.—the latest of all dry-process cement mills

of lime, outcrop, the beds dipping at an angle of approximately 2 deg. in the direction of and passing under the city of Waco, at which point the beds are found at a depth of about 1200 ft. At Atco the beds are of sufficient thickness and extent to supply the plant for many years with practically no stripping, except removal of a small amount of brush and small trees. At present the face of the quarry has been opened up to a height of 35 ft., but a higher bench can easily be obtained by sinking without necessitating a load grade from the pit to the plant.

The Austin chalks, as the name implies, are quite soft and are in beds well shattered, making quarry operations a simple matter as well as economical. A single, motor-driven Sanderson well drill is sufficient to do all the drilling necessary, with no secondary drilling or shooting, making powder and drilling problems of secondary importance.

The Austin chalks as exposed here are of very uniform analysis and the quarry is not troubled with water except from occasional showers, two condition that lend themselves particularly to the use of the dry process for producing portland cement. A typical analysis of the Austin chalk is as follows:

SiO_2	5.58%
Fe_2O_3	0.97%
Al_2O_3	1.99%
$CaCO_3$	88.10%
$MgCO_3$	0.95%

A third factor that governed the choice of this particular location for the erection of this plant was that at this place the Austin chalk contacts with the Eaglesford shales, the plant being a few hundred yards from the contact, making the transportation of both the limestones and shales a simple matter. The Eaglesford shales extend over a large area to the south and west of the plant and are laid down in such a physical condition that they may be readily dug out without blasting.

The Eaglesford shales have the following average analysis:

SiO_2	54.02%
Fe_2O_3	0.97%
Al_2O_3	18.50%
$CaCO_3$	9.33%
$MgCO_3$	3.34%

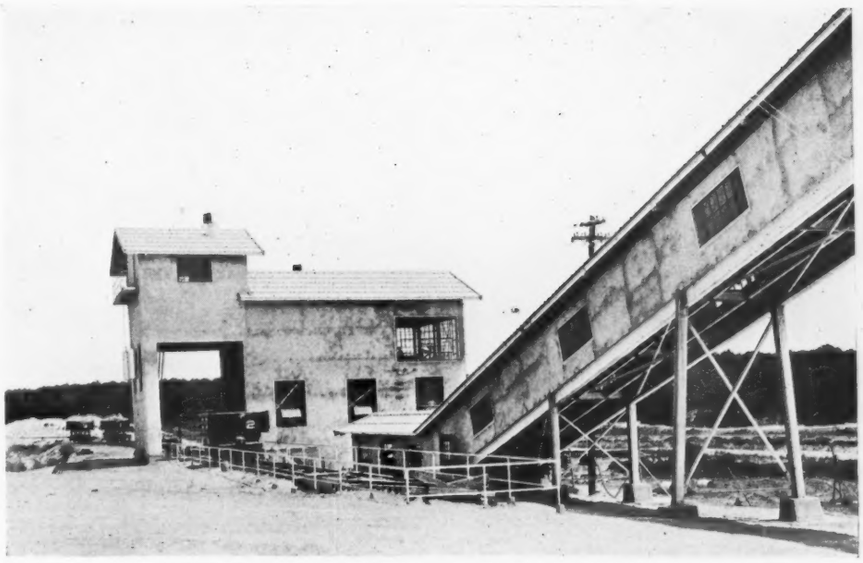
The limestone and shale are loaded by two 50-B Bucyrus shovels mounted on crawler treads, electric-motor driven, and with 1¾-yd. buckets. The shovels load to Woodford cars and are delivered to the plant using the Woodford controlled electric haulage system. This system of transportation is in essence one in which each car is a separate, motor-driven unit, with direct current supplied by a third rail, the control of the cars' movement being centralized at a single tower located on the upper floor of the crusher building. By dividing the track system up into short sections the movement of the various cars can be controlled; on one section of the track the cars can be increased or decreased in speed or stopped entirely

The Waco plant under construction—this view was taken on May 1, 1929

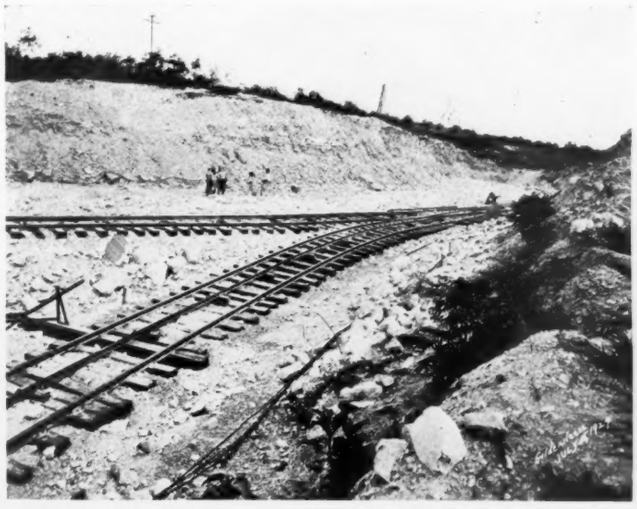
without interfering with the movement of the cars on the other sections of the track. The single control tower referred to regulates the movement of cars from both the limestone quarry and the shale pits. The company has three of these cars at present, each holding about 15 tons of material.

The cars on arriving at the crusher plant are side-dumped into a single No. 60 Pennsylvania hammer mill which reduces the stone from quarry size to 1 in. and under in a single operation. The installation of a hammer mill of this size and type to serve as a primary crusher, doing away with any secondary crushing, is one of the few installations of its kind in the cement industry. The hammer mill is fed by a Pennsylvania reciprocating pan feeder, driven through a Cleveland gear reduction unit, and is driven by a 350-hp. General Electric induction motor, at 600 r.p.m.

The crusher is used for crushing both limestone and shale, operating alternately on



The limestone crushing building and structure for silo storage conveyor



Limestone quarry opened at Atco to supply the Waco mill

the two materials. Means are also provided for feeding shale direct to the belt conveyor that serves the hammer mill, as the material from the pits is in such a condition that little or no crushing is necessary.

A belt conveyor elevates the material through an angle of approximately 20 deg., discharging to a single reinforced concrete silo, that is divided into four compartments for storage of both the limestone and shale. During ordinary operation one compartment suffices for the shale and the other three for stone, although this procedure is flexible and any of the bins may be used for the two materials as desired.

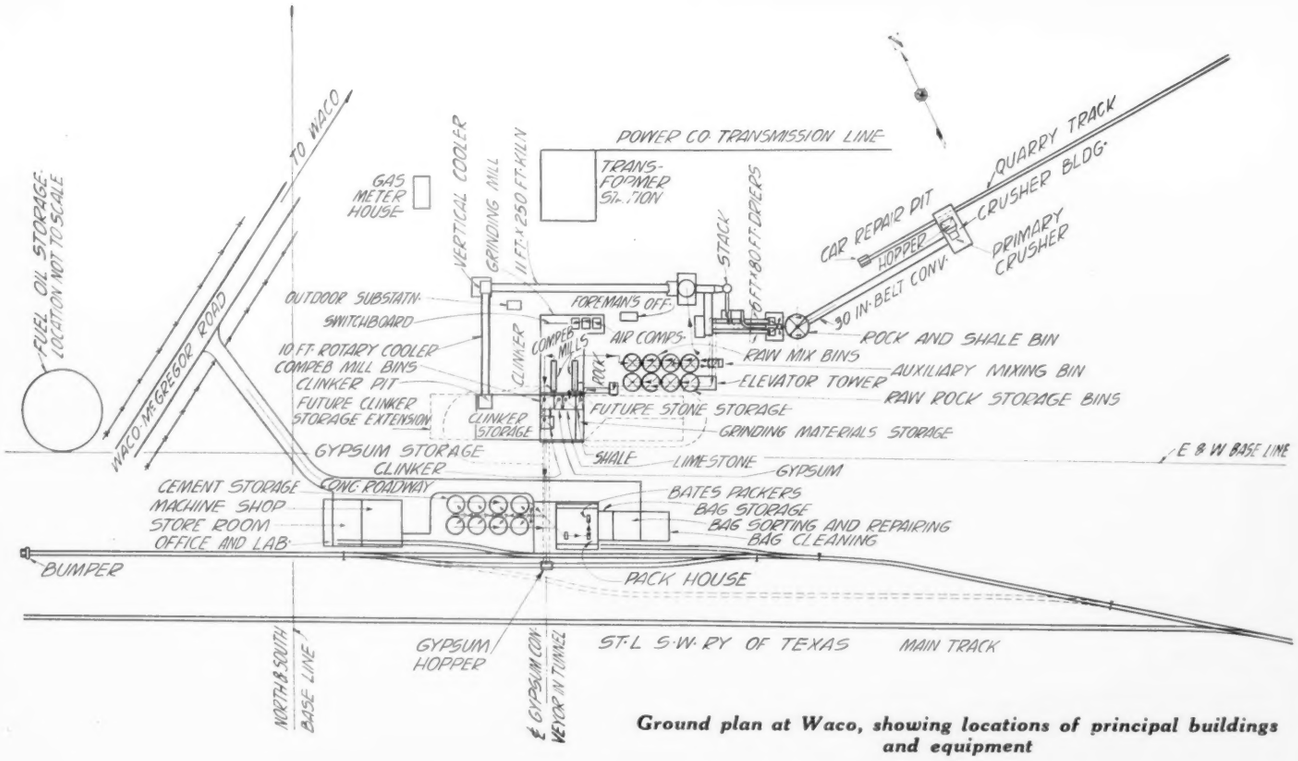
The shale or stone is taken by a second belt conveyor from this silo by suitable gates at the bottom and delivers the products to two 6x60-ft. Vulcan rotary driers that use the waste-heat from the kiln, with provisions being made for supplying additional heat from natural gas burners. It might be said at this place that the entire operation of this plant will be practically dustless, for all sources of dust are provided with suitable dust-collecting equipment. Any dust that is made incidental to the drying operation is collected in dust collectors supplied by the Dust Recovery, Inc., and the dust so collected is fed back into the system by a series of screw conveyors under the collectors.

The dried stone or shale falls to a cross belt conveyor that delivers the material to an elevator serving four concrete silos, which also are divided into four sections each, and the materials are stored separately in these various bins. The stone and shale in these silos is drawn separately and passes to a Richardson "Convey-o-weigh" scales that automatically convey, weigh and proportion the chalk and shale to make up the raw mix, discharging to a single, No. 8745, Allis-Chalmers Compeb mill. This type of machine for proportioning the two products consists of two separate pan conveyors that act as the scale bed, and each is suspended much after the manner of an ordinary scale platform, with additional means of automatically feeding the material to the pans until a predetermined amount has been delivered, after which the feed stops and this batch of weighed material is delivered to the Compeb mill. The operation is then repeated. The scales are capable of adding from 2% to 50% shale, with its companion unit capable of adding from 50% to 98% limestone, performing this operation without any attention whatsoever and with a high degree of accuracy. The amount of each material added is regulated by the laboratory staff after a complete analysis of the two materials mixed has been obtained, and this constitutes the second step in the accurate control of the plant's output, the first step being the analysis of the material in the quarries. The shale and limestones are of such uniformity of content that very little adjustment or changes are necessary, however, and a uniform mix can be obtained within a fraction of a percent of that desired.

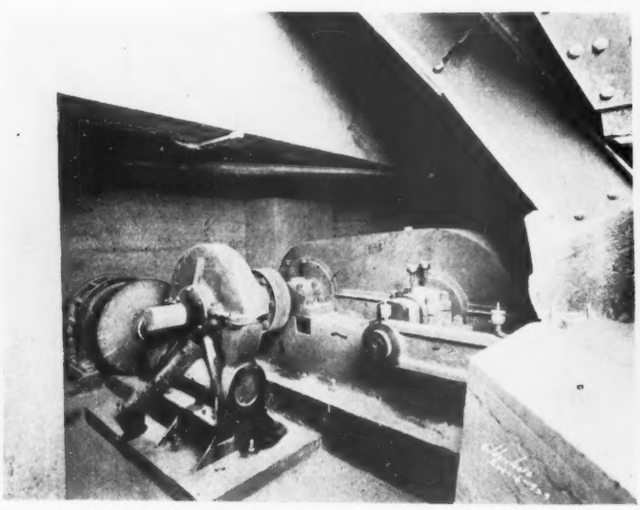
Left—The drier silo and its conveyor feed from the crusher building at the right

The Compeb mill

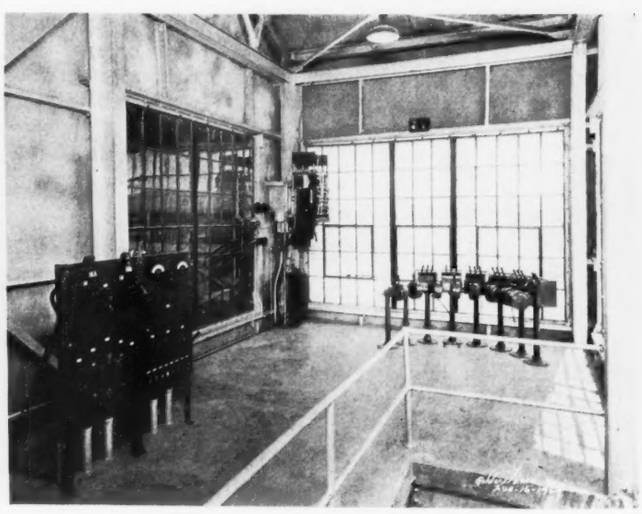
General view of the yard and mill



Ground plan at Waco, showing locations of principal buildings and equipment



Motor and drive of the raw feed elevator



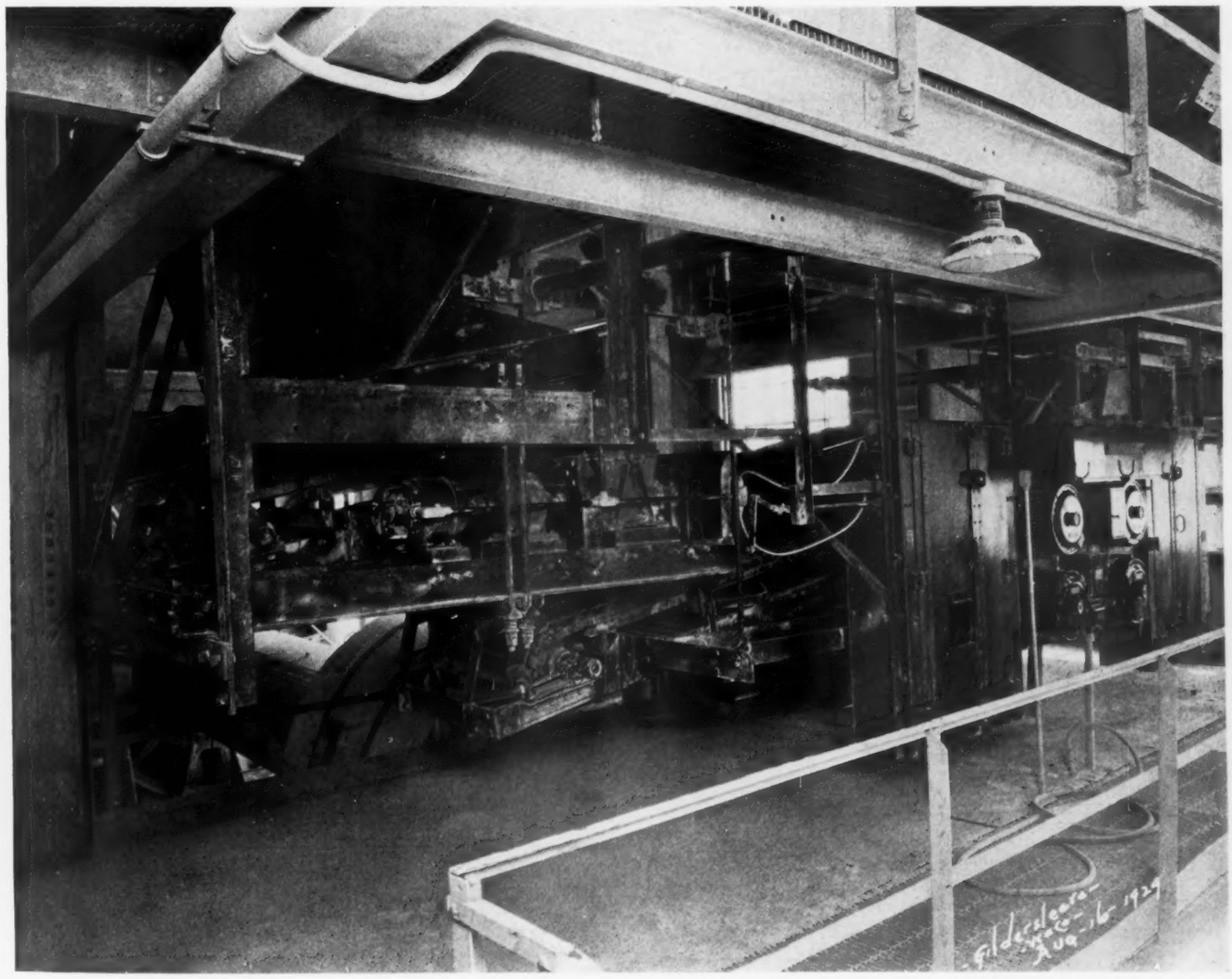
Controls for the electrical haulage system and crushing equipment

is driven by a 900-hp. Allis-Chalmers synchronous motor, operating the mill at 20-21 r.p.m., which with a ball load of 147,000 lb. gives ample grinding capacity for the plant. A preliminary production of 2000 bbl. per day was initially obtained, with an expected output close to 2400 bbl. when the wrinkles that are always encountered when starting a new plant have been ironed out. The mill is air-swept with Allis-Chalmers dust-collecting units. One feature that gives this mill its high capacity is the ease with which the two products are ground, both being by nature soft and readily disintegrated.

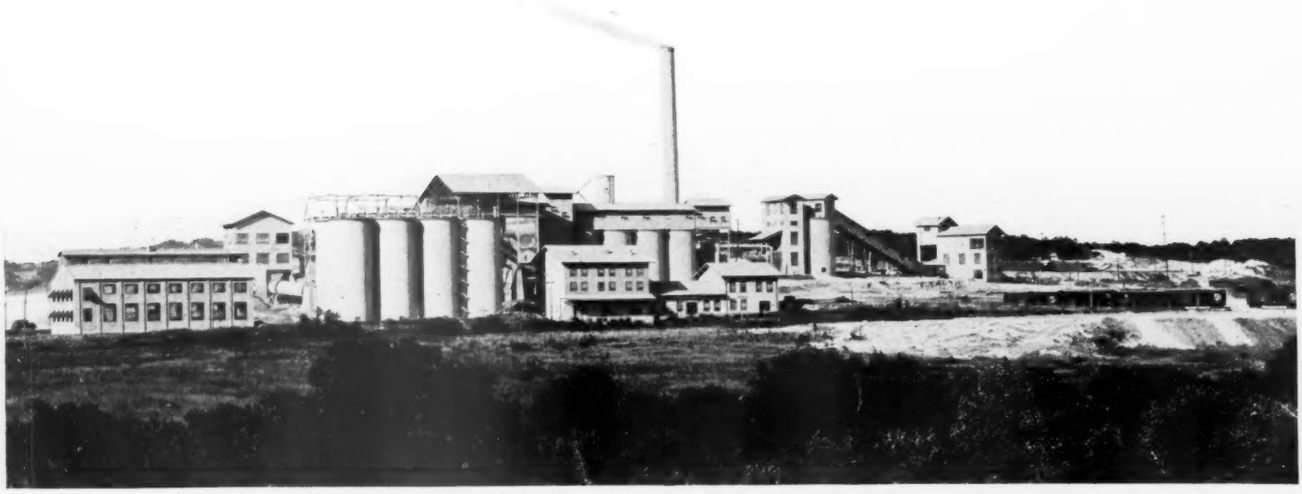
The pulverized material passes to a 6-in. Fuller-Kinyon pump, that conveys the dry material to four blending silos, each bin, as was the case with the bins previously mentioned, being divided into four compartments. To insure a thorough blending, or mixing, of the materials before passing them to the kiln for burning, the system devised by the Fuller Co., the Fuller-Kinyon system of dry blending has been adopted. By this system the kiln feed can be drawn direct from one or from all of the various bin compartments simultaneously, after their analyses have been obtained as a check. This stream is split and a certain amount returned to the top of one or all of the bins. By alternately drawing material from one bin every second, or for any predetermined time, or from all bins and returning a greater portion alternately at definite time intervals to the same bin, it can be readily seen that each bin's content is made up of a thin layer of raw-feed material, a fraction of an inch in thickness, which with the "funnel effect" when withdrawing at the bottom, results in a remarkably accurate mixing. By the use of this system the analysis of the finished cement can be controlled as accurately as by the use of the wet process, it is said. A feature of this installation is that a control board is provided with means by which the flow of raw mix can be readily traced, a series of lighted tubes that represent the various pipe lines through which the material passes. A light in any tube indicates that the raw product is passing through the particular pipe that this tube represents.

The mix is pumped to the single 11x250-ft. Allis-Chalmers kiln, which is fired by natural gas, with means also being provided for burning oil, should it become advisable to

Office and factory adjoining the shops



Automatic scale which conveys, weighs and proportions the limestone and shale mixture passing to the grinding mill



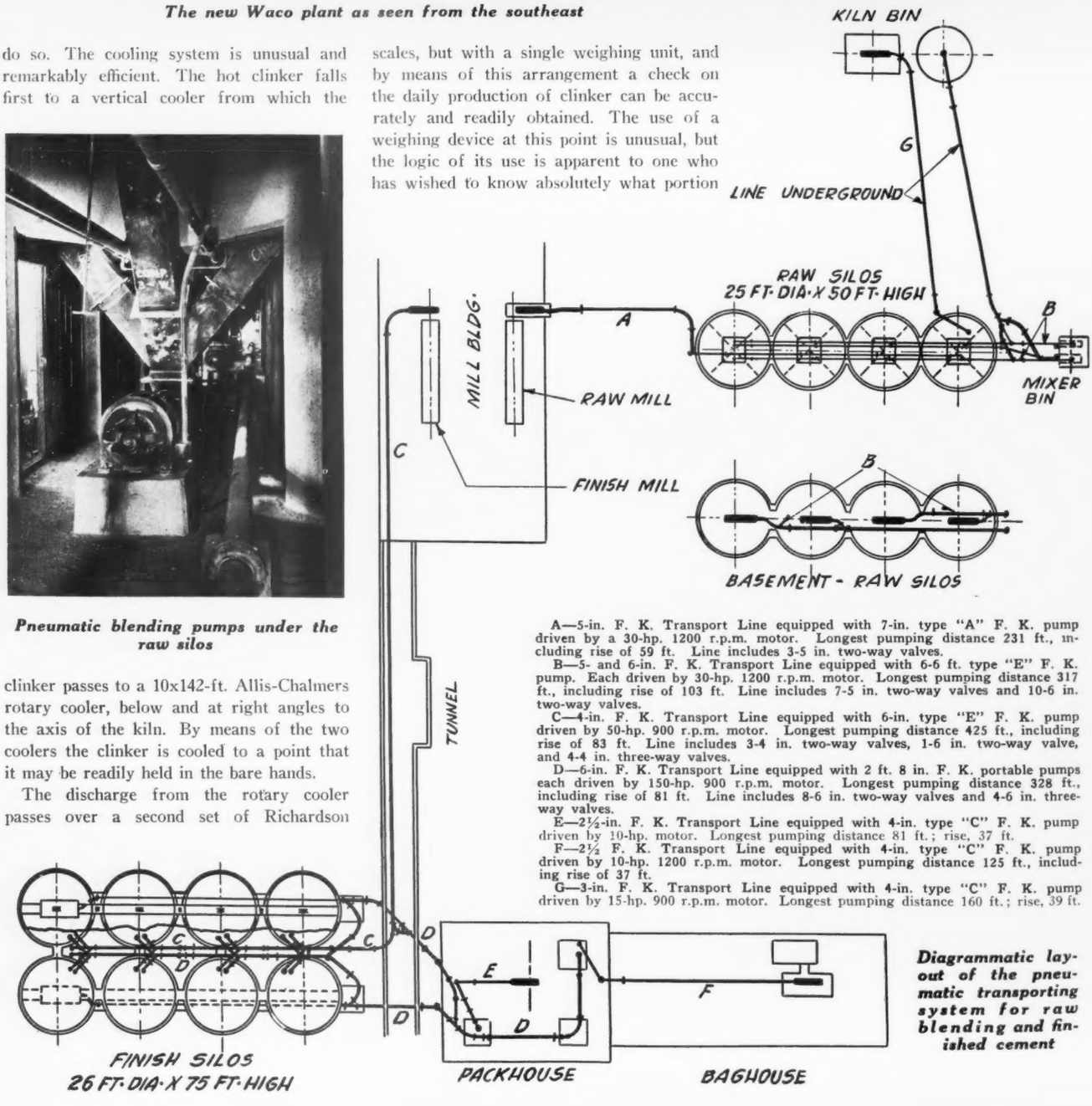
The new Waco plant as seen from the southeast

do so. The cooling system is unusual and remarkably efficient. The hot clinker falls first to a vertical cooler from which the

Pneumatic blending pumps under the raw silos

clinker passes to a 10x142-ft. Allis-Chalmers rotary cooler, below and at right angles to the axis of the kiln. By means of the two coolers the clinker is cooled to a point that it may be readily held in the bare hands.

The discharge from the rotary cooler passes over a second set of Richardson scales, but with a single weighing unit, and by means of this arrangement a check on the daily production of clinker can be accurately and readily obtained. The use of a weighing device at this point is unusual, but the logic of its use is apparent to one who has wished to know absolutely what portion



A—5-in. F. K. Transport Line equipped with 7-in. type "A" F. K. pump driven by a 30-hp. 1200 r.p.m. motor. Longest pumping distance 231 ft., including rise of 59 ft. Line includes 3-5 in. two-way valves.

B—5- and 6-in. F. K. Transport Line equipped with 6-6 ft. type "E" F. K. pump. Each driven by 30-hp. 1200 r.p.m. motor. Longest pumping distance 317 ft., including rise of 103 ft. Line includes 7-5 in. two-way valves and 10-6 in. two-way valves.

C—4-in. F. K. Transport Line equipped with 6-in. type "E" F. K. pump driven by 50-hp. 900 r.p.m. motor. Longest pumping distance 425 ft., including rise of 83 ft. Line includes 3-4 in. two-way valves, 1-6 in. two-way valve, and 4-4 in. three-way valves.

D—6-in. F. K. Transport Line equipped with 2 ft. 8 in. F. K. portable pumps each driven by 150-hp. 900 r.p.m. motor. Longest pumping distance 328 ft., including rise of 81 ft. Line includes 8-6 in. two-way valves and 4-6 in. three-way valves.

E—2½-in. F. K. Transport Line equipped with 4-in. type "C" F. K. pump driven by 10-hp. motor. Longest pumping distance 81 ft.; rise, 37 ft.

F—2½ F. K. Transport Line equipped with 4-in. type "C" F. K. pump driven by 10-hp. 1200 r.p.m. motor. Longest pumping distance 125 ft., including rise of 37 ft.

G—3-in. F. K. Transport Line equipped with 4-in. type "C" F. K. pump driven by 15-hp. 900 r.p.m. motor. Longest pumping distance 160 ft.; rise, 39 ft.

Diagrammatic layout of the pneumatic transporting system for raw blending and finished cement

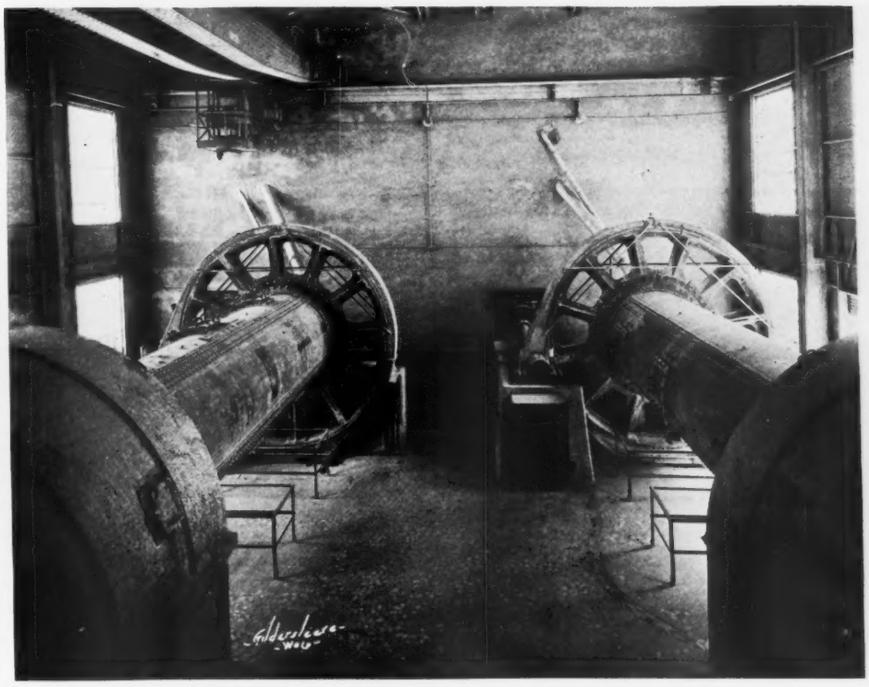
of the plant is or is not operating to its maximum efficiency.

The scales discharge to a small pit from which the Cleveland overhead traveling crane using a 3-yd. Hayward bucket can deliver the clinker to yard storage or to bins ahead of the single Compeb mill. This mill is of similar size, drive, etc., to that used for raw grinding. The crane also delivers the gypsum to a small bin alongside the clinker bin, and both bins discharge to a third set of Richardson scales, which weigh, convey and proportion accurately these two materials.

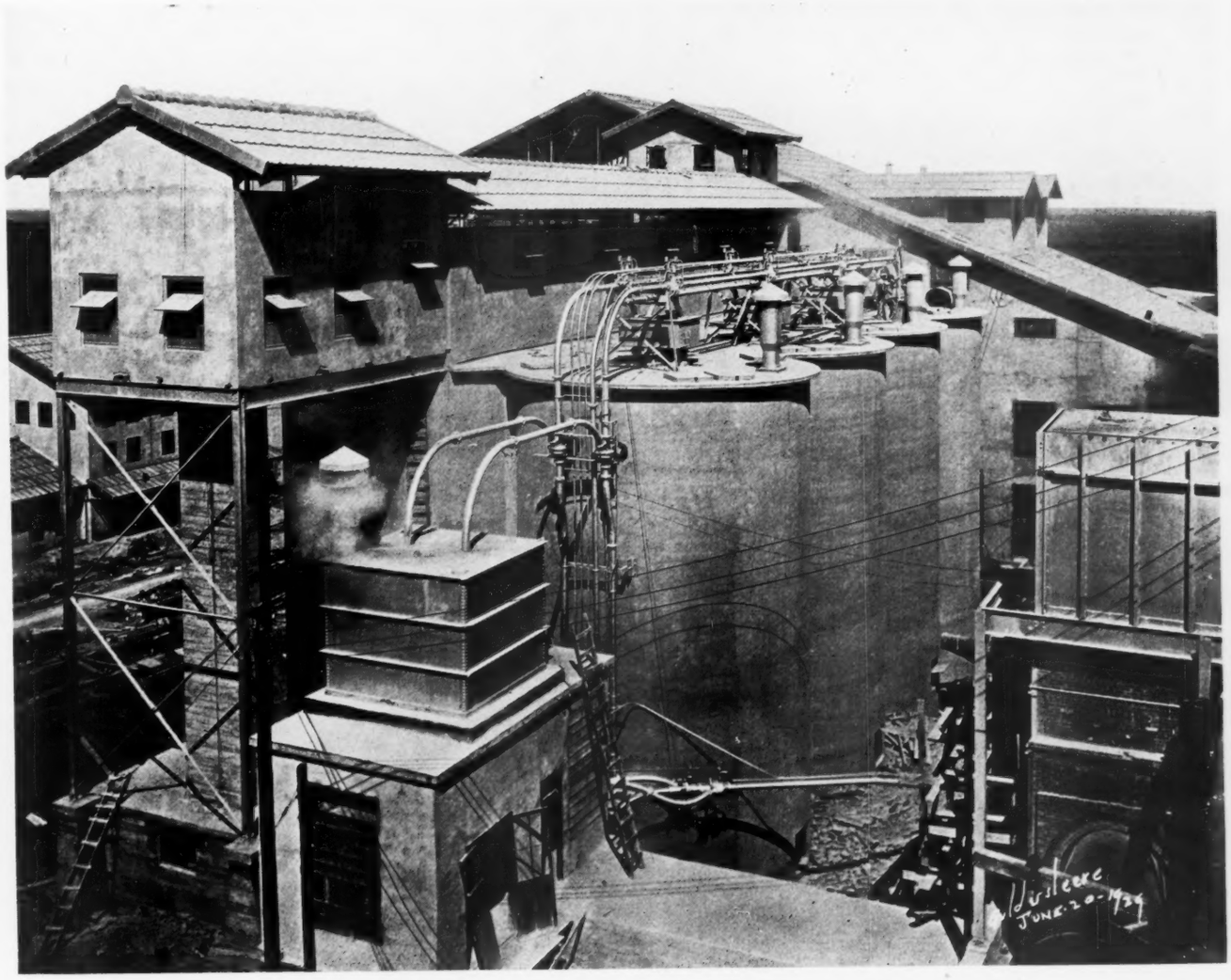
The Compeb mill is driven by a 900-hp. Allis-Chalmers synchronous motor operating the mill at 20 to 21 r.p.m. and carries a ball load of 147,000 lb. and maintains a fineness of 88% through 200-mesh. The ground cement is then delivered by a 6-in. Fuller-Kinyon pump to the eight concrete storage silos, holding 75,000 lb. of cement.

Delivery of Finished Cement

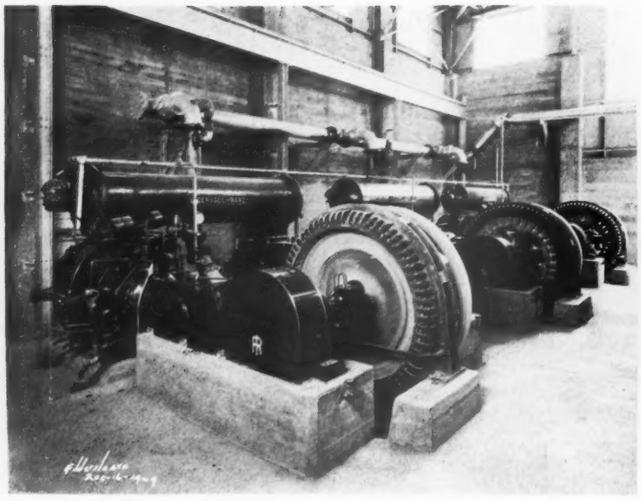
The cement in the storage silos is delivered to the pack house by Fuller-Kinyon pumps; these two units are mounted on industrial trucks on tracks passing under silos



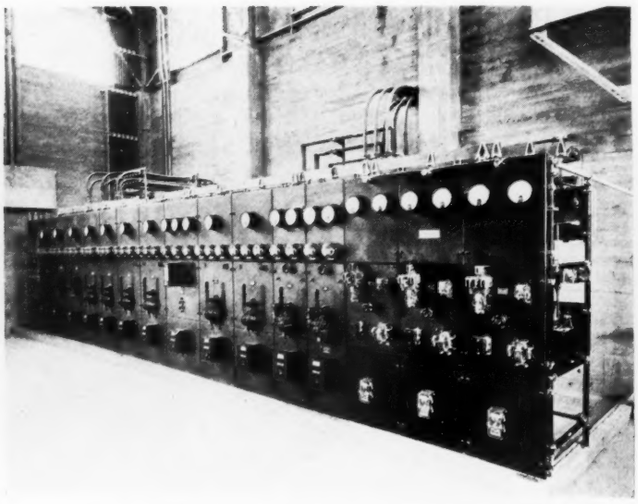
Raw and finish grinding mills



Raw blending silos and pipe connections from the pumps



Air compressors in the mill building



Main switchboard located in the power house

and parallel to each other. The pump and its drive motor can be shifted from place to place on this track and connections made to the bottom of the desired bin by a suitable flanged connection, and the discharge line from the pump is likewise connected to the pumping unit. By this arrangement all conveyors and bin-emptying devices are eliminated; and as the pump can be disconnected and reconnected to any bin gate, it results in a very convenient method of handling the finished cement.

Not only do these two pumps deliver to the pack house, but, if desirable, the discharge stream is returned to the storage bin, resulting in again blending the cement before it is packed, and making for a very uniform quality. The flow of cement through the various pipe lines incidental to this blending system is likewise controlled by a control board similar to that described in connection with the blending system.

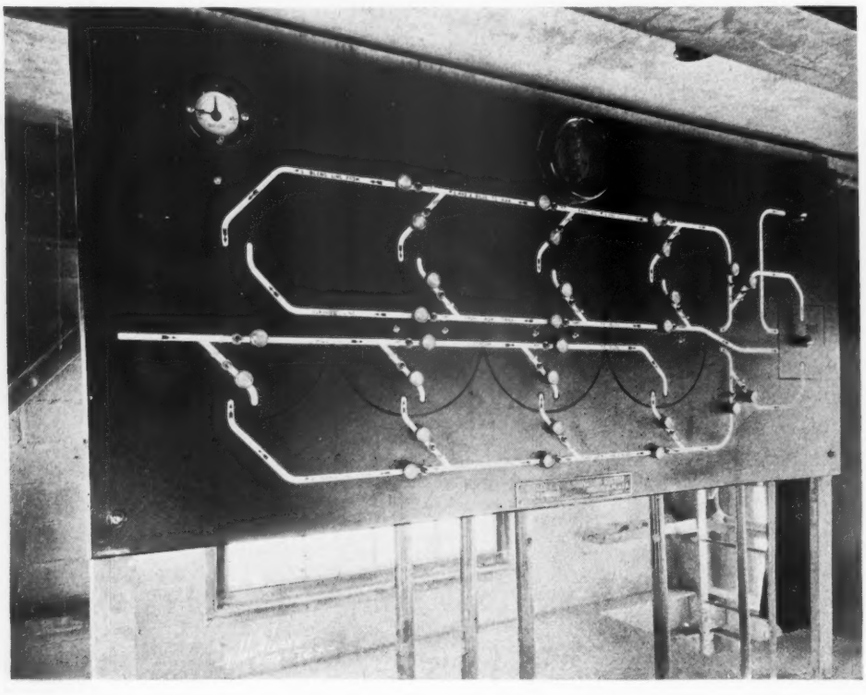
Pump house at the artesian well

The finished cement is packed in either cotton or paper sacks, although the former are preferred in Texas—being a cotton-producing state. The Bates valve-bag packers are used for sacking and so arranged that delivery can be made by truck or by rail. The spill from the sackers is delivered to a series of small diameter screw conveyors that serve a 3-in. Fuller-Kinyon pump located in the basement under the pack house, and this pump returns the spill to the sacker feed bins. The lighter dust is collected by dust collectors supplied by the Clark Dust Collecting Co., which with the dust-collecting system previously mentioned give ideal working conditions in the pack house.

Alongside the pack house, storage space has been provided for storage of cotton and paper sacks, sack-cleaning equipment and Bates bag-tying machines.

All of the various units in the plant are direct-connected to General Electric, Allis-Chalmers and Westinghouse motors through enclosed gear reducers, using Jones, Cleveland and Falk units where it is not possible to drive direct from the motor. Power is purchased from the Texas Power and Light Co., and natural gas is purchased from the Lone Star Gas Co.

Compressed air for the Fuller-Kinyon pumps and other plant uses is furnished by three Ingersoll-Rand, 1350-cu. ft. per min., free air, compressors. The conveyor belting used is Goodyear and Hewitt.



Control panel for the dry blending system

Miscellaneous, etc.

Ground was broken for the new plant September 24, 1928, and the first shipment of cement was made June 24, 1929, just nine months after starting construction, which speaks well for a plant of such excellent design and construction. All of the buildings are of steel-frame construction with cement stuccoed walls on metal lath, and plastered on the inside. Roofs are of green colored cement tile, which with the landscaping that

General view of the new Waco, Tex., plant of the Atlas Portland Cement Co.

was being done at the time of inspection will make a very attractive-looking plant.

Construction work was all done by the engineers of the company after designs of the company. A. G. Croll, vice-president in charge of operations of all of the plants of the Atlas Portland Cement Co., supervised and directed both design and construction, and the plant represents the last word in dry-process plants based on over 30 years of his experience.

The company maintains at the Waco plant a modern physical and chemical testing laboratory for control of the plant and for testing of the finished cement.

Bituminous Sands of Alberta

IN NORTHERN Alberta, Canada, an immense body of bituminous sand awaits industrial development. The subject has been investigated for years, but always proposed plants for its utilization are found to depend upon some factor that necessitates a long delay. Schemes for future development have been evolved; a plan for its present use is needed.

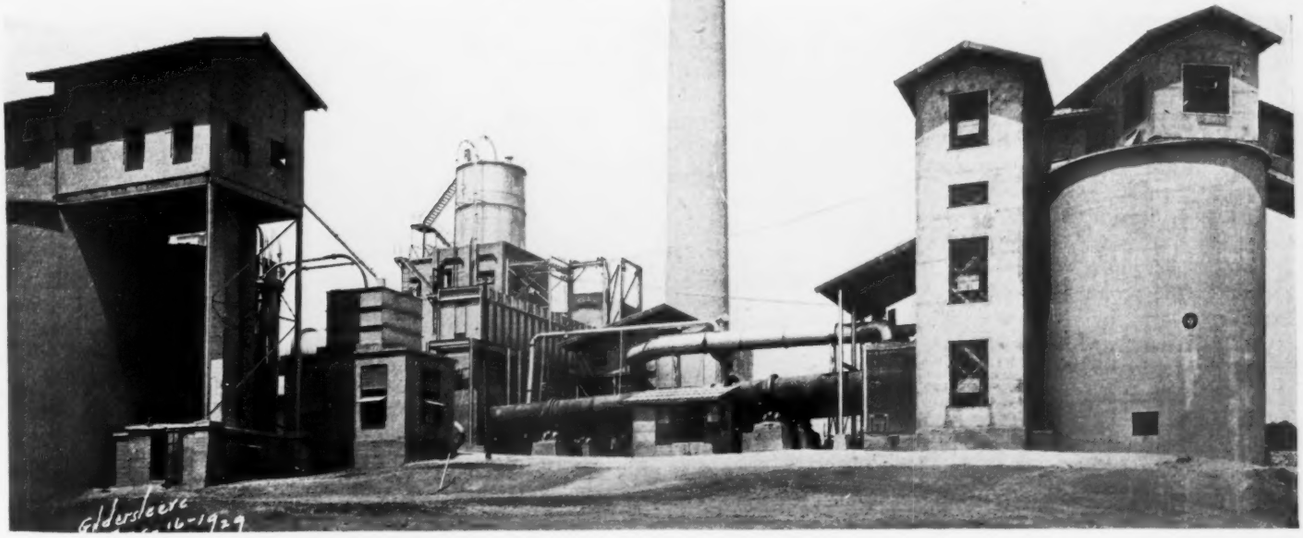
K. A. Clark, research engineer of the scientific and industrial research council of Alberta, has prepared and published three reports on this subject. The first two dealt with the occurrences of bituminous sands and possible methods for the separation of the bitumen contained in them. Now he has published a memoir on the utilization of these sands. In an exceedingly interesting review of the economic factors bearing on the case, he suggests that the use of bituminous sands offering greatest promise of successful development is in the manufacture of gasoline for the northern Alberta market. He proposes the establishment of a plant for the production of asphalt emulsions as a simple and convenient way of inaugurating development work, which he thinks "would lead on to the larger and more alluring field of gasoline manufacture." *Industrial and Chemical Engineering.*

Reducing Carbonate Hardness of Water by Lime Softening

A REVIEW ISSUE of *Municipal News and Water Works* describes a process by which the carbonate hardness of water is reduced to practically the theoretical limit through the use of lime. This process has been in continuous use at the Piqua water works since June, 1927, and has since been used at Columbus, Marion, Delaware, Greenville, Newark and other Ohio plants.

Gravitational Flow of Solid Particles

RECENT WORK on the derivation of a mathematical expression giving the rate of gravity flow of comminuted solids from bins or hoppers is described in the July issue of *Industrial and Engineering Chemistry*. Several equations are given which apparently represent the laws governing the flows of these particles. These may be useful in calculating the time of discharge of bins or hoppers holding sand, gravel, stone, cement and other materials.



Another view of the Waco, Tex., plant of the Atlas Portland Cement Co.

Porous Gypsum Plaster Products

A Survey of the United States Patents Relating to the Compositions and Methods for Producing Porous Plaster Products

By Joseph Rossman
Washington, D. C.

CONSIDERABLE INTEREST has been recently shown in the production of porous or spongy plaster products. Porous gypsum provides a good non-conductor of heat, applicable to boilers, tanks, pipes, or flues to buildings, cars, vessels, refrigerators, safes, water-coolers, stoves, and other places, constructions, and purposes where it is desired to prevent the transmission of heat. It is also applicable to parts of buildings as a non-conductor or deadener of sound; also in some cases where a material of light weight is needed, as in building or in surgery; also as a liquid-conductor to filters, strainers, evaporators, and lamp-wicks; also as an absorbent for various purposes.

About fifty years ago a basic patent No. 230,151 was granted to DeWitt C. Sanford for a porous or spongy mineral composition made from plaster of Paris. He mixed plaster of Paris with a small amount of bicarbonate of soda. Upon mixing with water carbon dioxide is evolved producing a porous gypsum. The disclosure of this patent is very instructive and rich in information and is here given in full. Nearly all the subsequent chemical methods for producing porous gypsum products are merely improvements on Sanford's patent.

The Sanford Patent

The invention consists, principally, of calcined gypsum, or plaster of Paris, in combination with one or more of the soluble alkaline bicarbonates, preferably the best commercial bicarbonate of soda. When these ingredients, in proper proportions and with a sufficient quantity of water, are well mixed a chemical change takes place and carbonic-acid gas is liberated, producing effervescence in the mixture, after which the mixture sets or hardens, forming an insoluble compound. If the proper proportions of the ingredients are used and the mixture properly manipulated after mixing and during the setting stage, numberless bubbles of the liberated gas will be entangled in the mixture while it is setting, and the desired cellular formation thereby be produced. The following formulas produce the best results:

Formula No. 1: Of plaster of Paris take 24 oz.; of bicarbonate of soda, 4/11 oz.; of water, 16 oz. This particular compound will set quicker than any of the compounds hereinafter named, and, having no combustible ingredients therein, it is the best in respect to its fireproof qualities; but it is not so porous and light as the other compounds named.

Gas-Entangling Additives

To make a lighter sponge add to those above named other ingredients which have the effect of more effectually entangling the gas and of retaining a larger proportion thereof in the mixture. They also permit a change of proportions of the gas-generating ingredients, enabling a larger amount of gas to be generated. The additional ingredients referred to are of a glutinous, mucilaginous, saponaceous, gummy, resinous character preferably wheat-flour and pulverized rosin, as follows:

Formula No. 2: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ½ oz.; of flour, ½ oz.; of water, 18 oz.

Formula No. 3: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ⅗ oz.; of pulverized rosin, ½ oz.; of water, 18 oz.

Additional ingredients of the nature glue, molasses, glucose, glycerine harden and toughen the sponge and prevent crumbling and efflorescence. For this purpose glue and glucose are preferred.

Formula No. 4: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ½ oz.; of glue, ¼ oz.; of water, 18 oz.

Formula No. 5: Of plaster of Paris, 24 oz.; of bicarbonate of soda, 4/11 oz.; of glucose, ½ oz.; of water, 16 oz.

Formula No. 6: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ½ oz.; of glucose, ½ oz.; of glue, ¼ oz.; of water, 18 oz.

Formula No. 7: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ½ oz.; of flour, ½ oz.; of glucose, ½ oz.; of water, 18 oz.

Formula No. 8: Of plaster of Paris, 24 oz.; of bicarbonate of soda, 9/16 oz.; of rosin, ½ oz.; of glucose, ½ oz.; of glue, ¼ oz.; of water, 18 oz.

Bulking Materials

To increase the bulk and to lighten and cheapen the composition, and in some cases to strengthen it, other materials, such as paper-pulp charcoal, coke, cinders, shavings, sawdust, hay, straw, chaff, hull of grain and rice, or hair may be used, the following being an illustration:

Formula No. 9: Of plaster of Paris, 24 oz.; of bicarbonate of soda, ¾ oz.; of rosin, ½ oz.; of glucose, ½ oz.; of glue, ¼ oz.; of water, 18 oz.; of paper-pulp (wet) 4 oz.

The use of the ingredients in addition to those of Formula No. 1 will more or less increase the time required for the setting or hardening of the compositions, all of which well set or harden naturally, but afterward require drying to get free of the superfluous moisture. The drying referred to may be by exposure to the open air or to a moderate heat.

Other Additive Ingredients

In connection with the above ingredients, additional ingredients may be used, among which are sulphuric acid, sulphate of iron, sulphate of zinc, alum, acetate of lead, all of which, with an increase of bicarbonate of soda, furnished an increased quantity of carbonic-acid gas, and all of which, in proper proportions, may be used as a sponge or leaven to mix with other ingredients, such as cement, clay, ashes, for the purpose of rendering them light and porous and causing them to harden or set.

As the effervescence is produced by chemical combination of some of the acid and alkali of the respective ingredients, it is necessary, in order to obtain the best results, that the proper proportions of each ingredient should be used, for if the action is too violent and the mixture too thin or wet all or too much of the gas will escape before the setting process takes place, and, on the other hand, if the action be too sluggish or the mixture too stiff or dry an insufficient amount of gas will be evolved, and in either case the desired porosity will not be obtained. Expertness, in this respect, of the operator will best be attained by practice.

To obtain the greatest degree of porosity the operator should aim to proportion the ingredients so as to obtain the largest quantity of gas that can be retained in the sponge until it sets, and without having the sponge settle.

Preparation of Mixtures

In preparing these various mixtures those ingredients containing an excess of

acid should be kept separate from those of an alkaline nature, either being in a moist state, until the final combination is to be made. For instance, in Formula No. 1 the plaster of Paris and the bicarbonate of soda may be well mixed in a dry state, and then the water added and the ingredients mixed; or the bicarbonate of soda may be first dissolved in the water and then this solution mixed with the plaster of Paris; or the plaster of Paris and water may be mixed and the bicarbonate of soda quickly added and mixed; but this latter mode is not preferable, as the sponge is apt to be irregular in structure.

Compounding

In compounding Formula No. 9 the dry ingredients plaster of Paris and bicarbonate of soda may be mixed; then a mixture of all the other ingredients may be made, and then the two mixtures mixed together; or the bicarbonate of soda may be included in the last and wet mixture. The glue and glucose should first be well dissolved in some of the 18 oz. of water.

It is best to make separate solutions of the requisite strength of all the ingredients that require to be dissolved, and then combine these solutions, being careful to preserve the proper proportions of the solutions and ingredients. The glue and glucose and bicarbonate of soda should not be brought into contact until the combined solution is in its most diluted state, in order that the bicarbonate of soda may not injure the properties of the glue and glucose; but contact of the rosin with a strong solution of bicarbonate of soda is beneficial.

In applying the ingredients of the sponge to other and more bulky materials as a leaven for them, the proportion of the ingredients must be proportioned to the nature and quantity of said materials and to the purposes desired. In such applications the proper proportions can be arrived at only by experiment and observation in such special applications.

The above instructions, with ordinary observation and reflection, will enable any one to properly prepare and use the other described mixtures, as well as similar ones that may be required.

In all cases the final mixing of each mixture should be made as quickly as a thorough mixing will permit. It should then be quickly poured where wanted and allowed to remain unagitated until it has finally set.

The composition may be run into molds of any desired shape, and then when the substance has hardened and dried sufficiently the castings may be applied in sections, or as desired; or it may run into or on the place where it is wanted, and allowed to harden there by applying proper means to confine and hold it in position until it sets.

The proportions of the ingredients of the described mixtures are applicable to castings of a thickness vertically of two or three inches or more. When running thinner castings the mixtures can be made more active by using more bicarbonate of soda, and thereby a greater degree of lightness secured. One bulk of the sponge exceeds that of the ingredients 50% to 150%.

The sponge may be prevented from absorbing water or other fluids by giving it, when dry, a coating of rosin, sulphur, or other suitable waterproofing material, or by inclosing it in a thin metal casing.

Other Methods

The production of voids in gypsum has been effected in many other ways. In patent No. 1,230,085 sulphate of aluminum and carbonate of calcium are used. The two compounds react to produce carbon dioxide gas which permeates the mass.

Patent No. 1,230,297 uses a starch solution which produces voids upon drying. In patent No. 1,638,001 calcium caseinate is precipated in the gypsum. When the mass dries a porous product is obtained. An excess of water is mixed with the gypsum in patent No. 1,450,856. When the water evaporates voids are left in the gypsum.

Direct Aeration of Gypsum

Air has been used directly in producing porous products. In patents No. 845,365 air under pressure is forced into the plastic mass which is immediately poured into a mold where it sets.

A recent patent No. 1,588,059 introduces air into the mass of the gypsum, which is stirred by rotating blades. The air is beaten or whipped into the gypsum and minute bubbles are distributed throughout the mass.

Another patent, No. 1,620,915, agitates the gypsum mass while carbon dioxide is injected into it.

The Use Foam

An entirely different method of producing porous gypsum has been developed by the use of a foamy mass which is added to the plaster mix. A colloid is beaten up to form a foam. In patent No. 1,504,645 a glue solution is used together with a foam assisting agent. The foam produces a porous mass when the gypsum sets. In British patent No. 263,571 any protein substance in colloidal solution is used to make the foam. Egg albumen, blood albumen and casein are suitable. A foam assisting agent is added, such resin dissolved in alcohol or acetone, with sufficient formaldehyde to cause the resin to disperse when added to an adequate liquid. The precipitated resin remains in suspension and becomes a part of the walls of the bubbles, protecting and strengthening them.

Another British patent No. 203,718 discloses a method of manufacturing porous building materials which consists in producing a foam by means of mucilage, for example, sea-tang or tangin. Gelatine or formaldehyde may be added to make the foam more durable. The foam is added to the gypsum producing a porous product.

Survey of Existing Patents

The following abstracts of the United States patents give a complete survey of compositions and methods for producing porous plaster products up to June, 1928:

1. Sanford, 230,151. July 20, 1880.

A process of manufacturing porous cellular mineral sponge, which consists in combining plaster of Paris, bicarbonate of soda and water.

2. Fowler, 288,935. November 20, 1883.

Sheets of fireproof material produced by compounding, when in a dry state 70% of calcined plaster of Paris, about 20% of asbestos, 5% of lamp-black and about 5% of pumice-stone, such dry compound to be wet with water to a suitable consistency, then run off upon a level surface into the thickness and size of sheets desired and allowed to dry. Lamp-black is combustible when subjected to a high degree of heat, but is of value in this compound because of the fact that when evenly and carefully mixed therewith it renders the whole mass porous, and it is a well known fact that an infinite number of air cells increases very largely the capacity of a fabric to resist the action of heat. Other materials such as finely ground sawdust or wood pulp could be used; but lamp-black is preferable because of its infinite fineness, and thus its usefulness in producing an infinite number of air cells.

3. Carey, 506,870. October 17, 1893.

A new process for forming fireproof coverings, consisting in first thoroughly mixing asbestos fiber and plaster of Paris in a dry state, the proportions of the ingredients being preferably ⅓ asbestos to ⅔ of plaster of Paris, then mixing with water and 6% Glauber's salt, molding and drying same, and then saturating with soluble glass. The effect of the Glauber's salt is to make the paste set with extreme rapidity when poured into the molds and a very light porous and elastic product is the result. As ordinarily made with water alone these results could be obtained, as the product, setting more slowly as it does, is very apt to become heavy and soggy. This quick setting of the mass is a very essential part of the process, as it renders the product very porous and consequently very light, and this porosity makes the covering also an extremely good non-conductor of heat. This porosity and consequent excellent non-conductivity of the material is due to this quick setting of the material and as a result of the ingredients used.

4. Chase, 516,914. March 20, 1894.

A composition consisting of 25 lb. of sulphate of lime to which are added 2 oz. of

oil-cake meal and 4 oz. of hydrated lime. This is well mixed that these ingredients may become thoroughly incorporated. One dram of cream-tartar, ½ oz. of carbonate of soda and 1 oz. of oxide of lead and dextrine are added. When these ingredients are thoroughly mixed a very efficient fire-resisting cement is produced from which wall plaster may be made by adding dry sand and water, making it light and elastic by adding a fiber, or other like substances, such as jute, asbestos or other ground fibrous vegetable or mineral matter. Oil-cake meal has a tendency to make the plaster impervious and it also toughens and unites the mass. Dextrine increases the hardness and adhesion. Oxide of lead readily unites with the oil-cake meal, increasing the cementing as well as fire-resisting properties. Soda and cream-tartar give off carbonic acid gas, which lightens the material, making it more plastic and easier to work.

5. Kleber, 581,466. April 27, 1897.

Ten parts of screened ashes, potash or other carbonates of alkalies are mixed dry with one part of a mixture composed of 80 parts of plaster of Paris and 20 parts of hydrated lime. The resultant mixture, after having been thoroughly worked and mixed, is formed into a plastic mass by mixing it with gypsum water that has been acidulated by means of 5% of sulfuric acid, and this mass is worked and kneaded until a mass has been obtained that is entirely plastic. From this stones are formed, which are subjected to great pressure in suitable molds. The green stones thus obtained are placed into a saturated alum solution or any other alumina solution which has been acidulated by one-third of sulfuric acid, and then the stones are ready for use.

6. O'Brien, 657,001. August 28, 1900.

A composition of matter designed for use in the production of blackboards and like surfaces, the same consisting, essentially, of putty-lime, sand, lamp-black, vinegar, portland cement, plaster of Paris and water.

7. Luttgen, 845,365. February 26, 1907.

The process of increasing the efficiency of heat-insulating structures, which consists in preparing a mixture of inorganic heat-insulating substances with water in a suitable receptacle; aerating the magma thus formed while in the receptacle by means of a perforated pipe passing into the mass; and employing the pressure produced within the receptacle by the escape of the compressed air for mixing, aerating and then ejecting the plastic material, immediately following its complete aeration, from the receptacle into a suitable mold where it is allowed to set in its aerated condition.

8. Bell, 932,098. August 24, 1909.

A plaster board or block formed of a mixture of plaster and loose comminuted paper distributed through the plaster to form a porous composition and having one or more layers of paper combined with the material.

9. Krieger, 1,184,184. May 23, 1916.

Kieselguhr, either in its natural state or dried, is calcined preferably above a red heat until the required strength is obtained, the temperature being sufficient to cause partial fritting or incipient fusion of the kieselguhr, with resultant increase in strength and density and some decrease in its porosity. The material is then crushed to approximately 4-mesh and finer and mixed with preferably 30 lb. of plaster to 100 lb. of kieselguhr taken and with sufficient water to give the proper consistency for casting into molded shapes. The composition while still plastic is then molded or poured into suitable forms or molds, and when it has set it is withdrawn from such molds.

10. Ashenhurst, 1,230,085. June 12, 1917.

The process of forming a cellular insulating material which consists in combining in the presence of water substantially 32 parts of asbestos which is inert in the subsequent reaction and which forms the major constituent of the final product, 8 parts of a salt having a strong acid radical such as sulfate of aluminum and 1 part of calcium carbonate, said last mentioned substances reacting to release carbon dioxide which permeates the mass, increasing the size of the mass, which finally hydraulically sets.

11. Hite, 1,230,297. June 19, 1917.

The method which consists in mixing plaster of Paris with a starch, paste mixed with water, so that the paste will hold the plaster in suspension until it has set and then evaporating the moisture therefrom, producing a porous body.

12. Ito, 1,245,723. November 6, 1917.

Calcium carbonate is formed by passing carbon dioxide into a solution of calcium hydrate and then turned into soluble calcium bicarbonate. To 100 parts of this solution of calcium bicarbonate from 4 to 7 parts of sodium bicarbonate is added. The fluid thus prepared is added to a mixture of 50 parts of kieselguhr, 20 parts of fibrous asbestos, 40 parts of carbonate of magnesium and 40 parts of anhydrous calcium sulfate. The whole is carefully kneaded. The paste thus formed may be solidified in a mold into any required shape, or may be applied directly to boilers, steam-pipes or the like to form heat-insulating layer thereon. The bicarbonate salt and calcium sulfate act to generate carbon dioxide very slowly, which makes the substance very porous. Moreover, the calcium sulfate prevents the substance from becoming soft paste, and at the same time removes the fear of the substance becoming cracked when solidified or of leaving, when applied to the boilers, pipes and the like, vacant spaces between their surfaces and the coating.

13. Walter, 1,313,931. August 26, 1919.

The process of making porous concrete which consists in incorporating with the ingredients thereof small particles of material which is insoluble in water and which does not affect the setting of the concrete such as paraffin and which itself is not affected by the concrete and which melts at a temperature which will not injure the concrete, permitting the concrete to set and exposing the concrete to a temperature high enough to melt out the extractable material, and after this to a current of super-heated steam to remove the remaining parts by steam distillation, leaving the concrete porous.

14. Ashenhurst, 1,353,622. September 21, 1920.

Reinforced insulating material consisting of a body of porous insulating material having a ribbed surface composed of fiber asbestos permanently joined to the body during the process of manufacture thereof.

15. Ashenhurst, 1,402,133. January 3, 1922.

A composition consisting of 20 parts by volume of gypsum having 4 lb. of a suitable retarder with each ton of gypsum, 2 parts by volume of magnesium carbonate and 2 parts by volume of aluminum sulphate. Where a reinforcing element is to be employed long fiber asbestos or cocoa fiber in the proportion of approximately 5% by weight of the mass is added. This compound in its dry state is inert. However, when it is to be utilized a quantity of water is added thereto sufficient to make a thick paste whereupon the leavening action begins and the mass expands or "rises," the final volume being many times that of the mixture as formed. While stability of form is secured within a short time, the final hardening is not complete for 24 hours. This patent has been reissued as No. 15,844, May 27, 1924, and No. 15,952, November 25, 1924.

16. Illemann, 1,450,856. April 3, 1923.

A quantity of calcined gypsum is mixed with an excess of water, in or about the proportion of 6 parts, by measure, of water, to 1 part, by measure, of gypsum. The gypsum is gradually introduced and then the mixture is intermittently agitated until a plastic spongy mass of gypsum is produced by the absorption of the excess of water, whereafter the water, in the gypsum mass, is evaporated by heat or allowed to evaporate gradually under atmospheric conditions. As the water evaporates its place is taken by air, which enters the microscopic cells or spaces formerly occupied by the excess water, so that a mass of gypsum is produced which is highly porous, the pores being filled with still air. The air-cell gypsum is suitable not only for non-conducting purposes, so far as heat and cold is concerned, but also for sound deadening and like purposes.

17. Rice, 1,504,645. August 12, 1924.

Cement is mixed with a suitable foam made by beating up a gel-like mass, generally a colloid. A glue solution is used to which a mixture consisting of resin dissolved in acetone or alcohol to which sufficient formalin has been added to cause the resin to disperse in the form of a very fine pre-

cipitate when added to an aqueous liquid. After the cement and sand has been properly impregnated with the foam in the presence of water, it is ready to be poured into the mold, producing a porous mass.

18. Ellis, 1,518,189. December 9, 1924.

A process of forming a porous composition of matter comprising mixing together plaster of Paris, ground charcoal, calcined asbestos and boric acid, then adding water containing ammonia until a homogeneous paste is obtained and finally pouring such pasty mixture into moulds.

19. Marczinczek, 1,574,252. February 23, 1926.

A wall material comprising a mixture substantially in the following proportions by bulk; volcanic ash 40%, pumice stone 20%, lime 20%, plaster of Paris 20%, the whole being intimately mixed.

20. Delaney, 1,581,795. April 20, 1926.

The method of producing a sound absorbing surface, which consists in dashing onto the surface to be covered, a mixture of plaster having a gypsum base and lumps of pumice stone filler, and a material such as calcium carbide adapted to produce effervescence in the mass before the same becomes set and after the body has set, removing the surface from said body.

21. Schumacher, 1,588,059. June 8, 1926.

The method of aerating a mass of plaster which consists in placing such a mass into a chamber, introducing a gaseous agent thereinto at the periphery thereof, and creating a whirling agitating movement so as to drag said agent thereinto with the action of gravity and entraining the same in the body of said mass.

22. Brookby, 1,620,067. March 8, 1927.

A cellular plaster made from plaster of Paris 100 parts, aluminum sulphate from 6 parts to 3 parts, granular sodium bicarbonate from 2.8 parts to 0.45 parts, dextrinized starch (HHH gum) about 2 parts and soap bark from 0.1 part to 0.05 parts to which may be added, if desired, fine silica sand or pulverized quartz—10 parts.

23. Parkhurst, 1,620,915. March 15, 1927.

Process of making gypsum products which comprises mechanically agitating one volume of calcined gypsum with two volumes of water while injecting carbon dioxide into the mixture for a period of not less than about three minutes.

24. Wikkula, 1,623,989. April 12, 1927.

A method of preparing porous building material, which consists in mixing with particles of ice, a rapidly setting hydraulic substance, thereby to form an insulating coating on said particles and mixing said particles into a hydraulically hardening concrete mass.

25. Brookby, 1,638,001. August 2, 1927.

The process of producing a light weight gypsum product which comprises making a plastic mass of calcined gypsum and water, then precipitating calcium caseinate therein by adding to said plasitc calcined gypsum mass an aqueous solution of casein and ammonium hydroxide, said casein solution being proportioned substantially at the rate of ½ oz. of casein to substantially 0.33 cu. ft. of the composite mass, then then permitting the mass to set, harden and dry. A multitude of small dispersed voids results during the drying process and remain in the finished gypsum product.

26. Nelson, 1,641,641. September 6, 1927.

A formula for the production of a final cellular product, wherein the bubble producing medium consists of carbon dioxide gas evolved within the mass, weighing approximately 20 lb. per cubic foot, is as follows: 2 lb. fresh calcined gypsum (substantially free of impurities), 3 oz. aluminum sulphate, 1½ oz. calcium carbonate, 4 gm. (60 grains) soap and 8 gm. (120 grains) talc. The materials should be finely ground and thoroughly mixed and then introduced into or have added to them 26 liquid ounces of water. The mixture should be agitated or stirred in one certain direction, preferably with short intermittent periods of rest, for about one minute and then poured into a mold and allowed to set. Such substances as soap or saponin show absorption for the carbon dioxide gas and they function as effective emulsifying agents in the mass. Such substances also lower the surface tension of the fluid mass very considerably, which obviously is advantageous for the production of a cellular mass because when a bubble is formed an appreciable increase in the surface is involved and the higher the surface tension of the liquid mass the more difficult it will be to produce bubbles therein.

27. Thomson, 1,660,280. February 21, 1928.

In the treatment of quick-setting materials, such as plaster of Paris, it has been found that crystallization occurs at eddies or points of flow interruption. Such occurrences cause an acceleration of the setting of the plaster of Paris coming in contact with the crystals formed and an accelerated accumulation of wet plaster of Paris or gypsum occurs and may interfere with the continuous operation of such a process. To prevent such crystallization the internal faces of all stationary portions of the apparatus, in contact with the material under treatment, are covered with a resilient material such as relatively soft rubber or a cork base covered with rubber to which crystals will not readily adhere, owing to movement or vibration of the resilient material, caused by the flowing material and the jarring or vibration of the apparatus in operation. Such covering or coating may also be applied to the moving parts of the apparatus which come in contact with the wet material.

28. Thomson, 1,660,402. February 28, 1928.

A process for the production of porous building materials which consists in forming a slurry of normal consistency of plaster of Paris, causing a continuous flow of said slurry through a receptacle, adding thereto a bubble-forming agent and additional water for bubble formation, introducing into said slurry during its advance through the receptacle air in slender columnss to form cells or bubbles therein to render the mass cellular, agitating to subdivide said streams of air and regulating the porosity of the finished material by controlling the streams of air so introduced.

29. Roos, 1,666,180. April 7, 1928.

One hundred parts of calcined gypsum are mixed with 2.3 parts by weight of a solution of sodium silicate, giving a light weight board weighing 1700 lb. per 1000 sq. ft.

Water Resisting Concrete of Slag Aggregate

SLAG aggregates will make concrete which is fully as water resisting as good concrete made from other aggregates, according to Symposium No. 13 of the series published by the National Slag Association. For bridge construction, "it is exceedingly tough and resistant to the impact of loads passing over the bridge; the high compressive strength of slag concrete takes care of the maximum loads; and it has the advantage of light weight, reducing the dead load which the structure must sustain," according to one of the authorities quoted.

The work of such bridge engineers as T. B. Carrick, in Florida, and Col. Rabut, the French engineer who has built bridges, jetties and other public works in several parts of Europe, is mentioned in some detail. These engineers have deliberately designed structures with smaller cross sections than are usual with concrete to take advantage of the lighter weight of slag concrete.

There are noted about 75 highway bridges in the United States built of slag concrete, the longest being the bridge over the Oconee river, in Georgia, which is 3,187 ft. long, with 54 35-ft. girder spans. Several others are from 1,000 ft. to 2,665 ft. long. A number of railroad bridges of slag concrete are mentioned, one of which the Girard, Ohio, viaduct, is nearly a mile in length. The Ashtabula, Ohio, viaduct is said to be one of the most notable slag concrete structures in the country. It has seven open spandrel arches of 135 ft. span flanked by four curved deck girder spans on one side and two on the other.

There are many other structures beside bridges made of concrete which should be watertight, such as reservoirs, dams, pipes, water tanks and sewage disposal plants. Symposium No. 13 gives examples of the use of slag concrete in these.

Details of tests for the permeability of slag concrete are given from both American and European sources, and it is shown that concrete made from slag is at least as impermeable as concrete made with other aggregates.

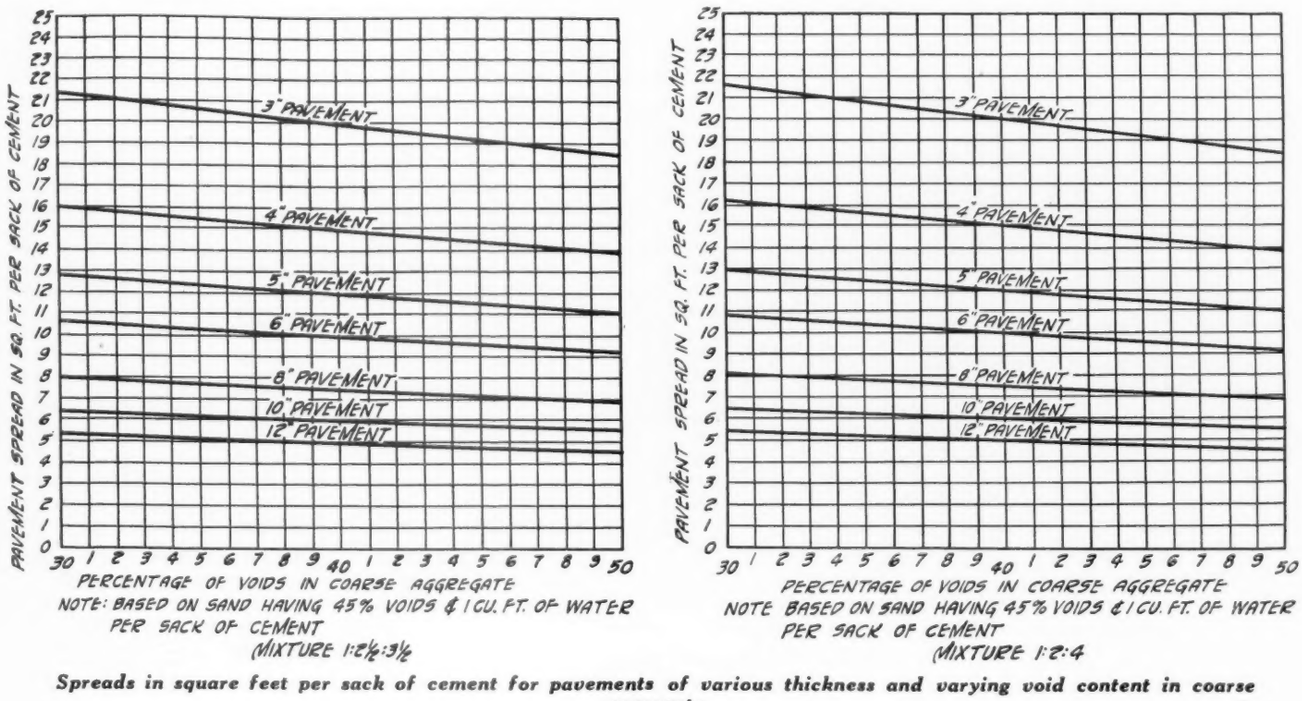
Effect of Aggregates on Concrete

By George Adams Roalfe
Consulting Engineer, Long Beach, Calif.

THE CONTINUAL ADDITION to the knowledge of concrete mixtures is inducing all branches of the construction industry to center more and more attention on its importance and effect not only on the resulting work, but also on the cost. Discussions of this nature might easily progress into the realms of theory to such an extent as to lose their value, but a study of the practical aspects of the problem is certainly highly desirable from the standpoint of any and all of the elements affected, and certainly not more so to any phase of the industry than to the producers of fine and coarse aggregates. Any move which tends to produce better work without increasing cost and in many instances at a lessened cost will sooner or later meet with popular favor.

As a basis for discussion it is to be assumed that the Abrams theory, more commonly known as the water-cement ratio theory, is generally correct. What modifications are necessary will be discussed below. Quoting from the Portland Cement Association's "Design and Control of Concrete Mixtures," second edition, page 4, we find the following statements: "If 1 cu. ft. of water is used for each cubic foot of cement in a concrete mixture the strength at a given age is *fixed, regardless of what quantities of aggregates are used,* so long as the mixture is plastic and workable and the aggregates are clean and made up of sound particles." And further in the same section we find the statement: "Designing a concrete mix for a given strength, therefore, consists in selecting the water-cement ratio corresponding to that strength and finding the most suitable combination of aggregates which will give the desired workability when mixed with cement and water in this ratio."

It is the belief of the writer, based on the observation and study of many concrete jobs of various characters, that the above statements need modification. In the first quotation we find the aggregates qualified only as to cleanliness and soundness. It is not believed that there can be much dispute as to the advisability of relative cleanliness, but this point is sometimes over-stressed; for example, cases have come to notice where coarse aggregates were condemned on account of supposedly detrimental percentages of fine material classed as dirt by casual inspection. Investigations of these materials disclose the fact that the dirt (so-called) was in reality fine rock dust; this rock dust was in such limited quantities that it undoubtedly would aid in creating a dense mix rather than acting as a detrimental ingredient. Further, in some of these cases a mineral lubricant such as diatomaceous earth was added to create workability; it is hard to recognize the reasonableness of such a situation. The word "sound" is rather an elastic term, as any material that is more or less in its natural condition might be termed to be sound, it being evident that aggregates marketed even in limited areas vary considerably as to hardness and other physical characteristics. From the second quotation we find that the statement assumes that the quality, shape and grading of aggregates are not supposed to influence the strength of the resulting concrete. If this were true and assuming a uniform water-cement ratio, any suitable filler might be used without affecting the resulting strength. Certain engineers in southern California advanced as a test for aggregates cylinders made with high alumina cement or with a high percentage of portland cement so as to produce 4000- to 7000-lb. mortar at 7 days. They proposed to take a given quantity of mortar and mix this with a standardized grading of coarse aggregate and compare the resulting crushing strength of a cylinder so made with cylinders made of the mortar alone. It was further proposed that the crushing strength on the aggregate cylinders should have a limit set of 60% that of the mortar cylinders of the same age. Now if the second quotation were strictly true the crushing strength of


PAVEMENT SPREAD IN SQ. FT. PER SACK OF CEMENT
3" PAVEMENT
4" PAVEMENT
5" PAVEMENT
6" PAVEMENT
8" PAVEMENT
10" PAVEMENT
12" PAVEMENT
PERCENTAGE OF VOIDS IN COARSE AGGREGATE
NOTE: BASED ON SAND HAVING 45% VOIDS & 1 CU. FT. OF WATER PER SACK OF CEMENT
(MIXTURE 1:2½:3½)
PAVEMENT SPREAD IN SQ. FT. PER SACK OF CEMENT
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PERCENTAGE OF VOIDS IN COARSE AGGREGATE
NOTE BASED ON SAND HAVING 45% VOIDS & 1 CU. FT. OF WATER PER SACK OF CEMENT
(MIXTURE 1:2:4

Spreads in square feet per sack of cement for pavements of various thickness and varying void content in coarse aggregate

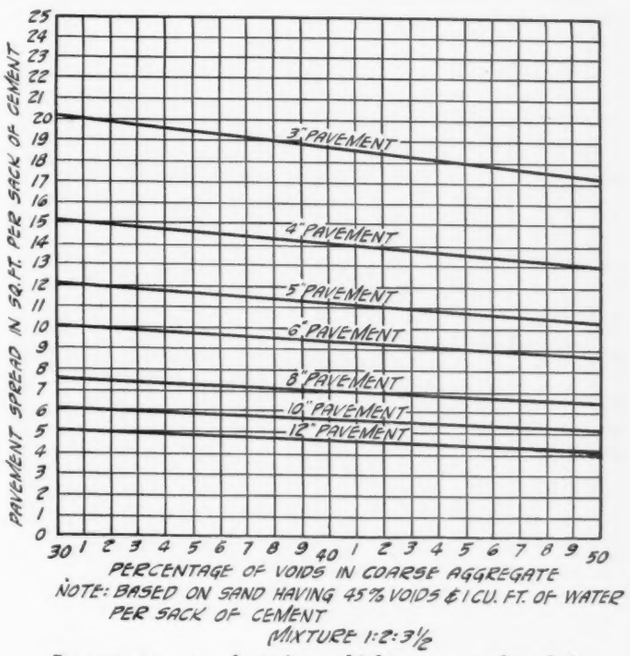
the mortar and that of the aggregate cylinders should be identical as the procedure called for the same water-cement ratio. The results of considerable test work showed that 60% of the mortar strength was sufficiently high in order to avoid ruling out aggregates which by other tests had proved usable. Below are given the results of a number of tests from which the proposed 60% ratio was derived.

REPORT OF TEST ON COARSE AGGREGATE FOR CONCRETE WITH PORTLAND CEMENT AND ALSO "LUMNITE" CEMENT

Rock grading:		
Passing ¼-in. sieve	4%	
Passing ¾-in. sieve	38%	42%
Passing 1-in. sieve	23%	65%
Passing 1½-in. sieve	35%	100%
Sand grading:		
Passing No. 4 screen		86.7%
Passing No. 30 screen		34.3%
Passing No. 100 screen		3.2%
Silt, loam, etc., by volume		3.0%
Voids		32.0%

Cement used, local brand.
Water-cement ratio, portland cement, 0.75.
Approximate mortar slump, 6½ in.
Size of test cylinders, 6x12-in. and 2x4-in.
Water-cement ratio, "Lumnite," 0.85.
Approximate mortar slump, 6½ in.

METHOD OF MAKING CYLINDERS AND TESTING—Portland cement mortar and concrete cylinders: Mortar consisted of 1 part cement to 2 parts sand by volume, using water = 50% of cement by weight (water-cement ratio by volume = 0.751). This was hand mixed and used to make the 2x4-in. and 6x12-in. cylinders of mortar; 6x12-in. concrete cylinders were made using 14.90 lb. of this mortar mixed with 0.145 cu. ft. of coarse aggregate so as to give a 1:2:3½ concrete by volume; "Lumnite" cement mortar and concrete cylinders; mortar consisted of 1 part cement to 2.75 parts sand, by volume, using water = 56.4% of cement by weight (water-cement ratio, by volume, = 0.85). This was hand-mixed and used to make 2x4-in. and 6x12-in. cylinders; 6x12-in. concrete cylinders were made using 15 lb. of same mortar mixed with 0.145 of coarse aggregate so as to give the same volumes of mortar and rock as used in the portland cement cylinders; this gave a mix of 1:2.75:4.35 by volume. Mixing, curing and testing were according to A.S.T.M. methods.


PAVEMENT SPREAD IN SQ. FT. PER SACK OF CEMENT
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12" PAVEMENT
PERCENTAGE OF VOIDS IN COARSE AGGREGATE
NOTE: BASED ON SAND HAVING 45% VOIDS & 1 CU. FT. OF WATER PER SACK OF CEMENT
MIXTURE 1:2:3½

Pavement area of various thicknesses produced in 1:2:3 1/2

In the above the same "Lumnite" mortar tested in 2x4-in. cylinders gave results averaging over 400 lb. per sq. in. higher than when tested in 6x12-in. cylinders. The average ratio of "Lumnite" concrete samples to their respective mortars was 67.6% when compared to 6x12-in. mortar specimens and 64.9% when compared to 2x4-in. specimens. Practically all the aggregates marketed in southern California were represented in this work.

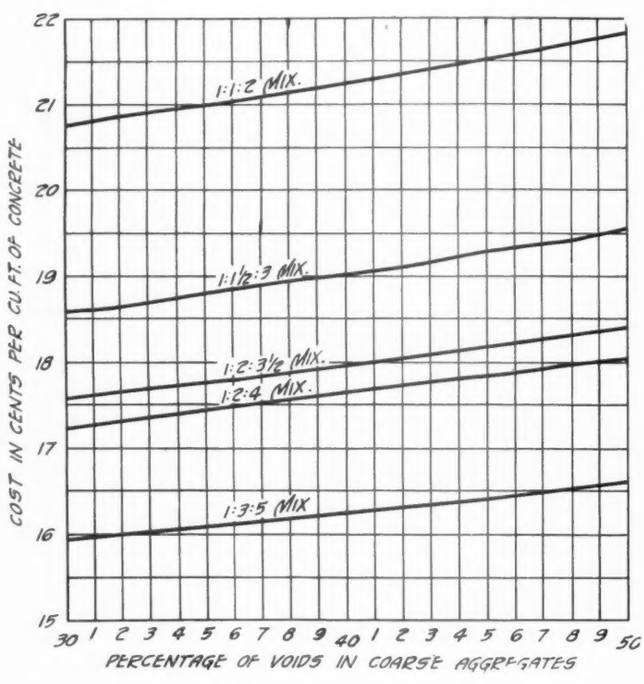
The writer, who attended the conferences where discussions of these tests were held, opposed this type of specification prior to the results of the tests being known, not only from the standpoint of their unfairness to certain aggregates because of the high mortar strengths specified, which were generally speaking from two to three times the strength of the mortars in common use, but also from the standpoint that a material such as a coarse aggregate should not be made to suffer from the possibility of variations in other factors affecting such strength tests; as, for example, variations in sands, variations in cement, and the personal equation due to the operator. He further contended that if such a test were a measure of the usability of the aggregate, the proper way to determine its reliability was to test an aggregate or a filler of extreme softness and one of extreme hardness concurrently with an aggregate that was known to be of a good character.

Such an investigation was conducted using a grading of corks designed to give the same voids as the coarse aggregate, and for the hard filler, steel punching slugs of various diameters and thicknesses were used to give similar conditions. The results were rather astonishing; in order of the strengths obtained the cork specimens showing the low-

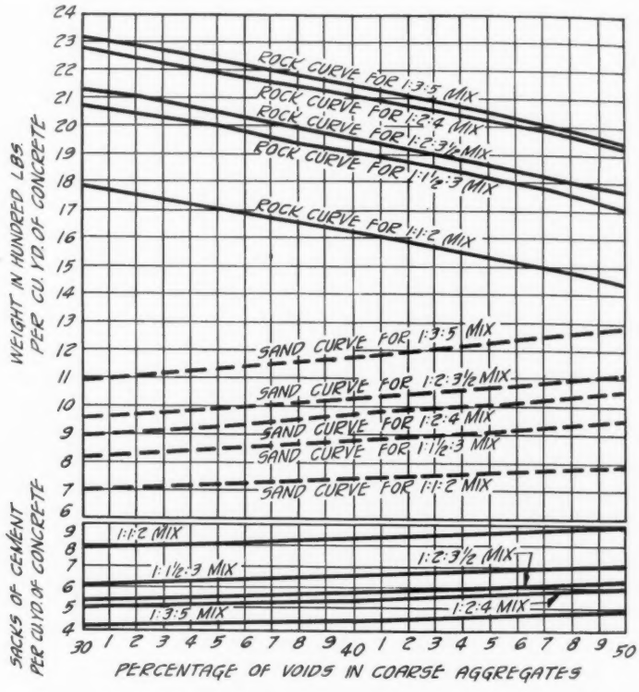
Rock Number		1	2	3	4	5	6	7	8	9	10	11
Comp. str. lb. per sq. in. port. cem. con. 1:2:3½ 28 days.	First	2,611	2,898	3,126	2,954	2,969	.....	3,180	2,630	2,916	2,761	3,486
	Second	2,700	2,871	2,999	3,079	3,009	.....	3,000	3,117	3,416	2,852	2,988
	Third	2,915	3,219	2,964	3,083	2,959	.....	3,182	3,118	3,156	3,173	2,980
	Total	8,226	8,988	9,089	9,116	8,937	.....	9,362	8,865	9,488	8,786	9,454
	Average	2,742	2,996	3,030	3,039	2,979	.....	3,121	2,955	3,163	2,929	3,151
Comp. str. lb. per sq. in. port. cem. mortar 28 days.	First	4,701	4,136	4,526	4,761	4,312	.....	4,364	4,416	4,384	4,164	4,472
	Second	4,342	4,161	5,031	4,715	4,001	.....	4,509	4,106	4,022	3,437	4,609
	Third	3,938	4,328	4,815	4,406	3,913	.....	4,181	4,086	4,427	4,983	4,417
	Total	12,981	12,625	14,372	13,882	12,226	.....	13,054	12,608	12,833	12,584	13,498
	Average	4,327	4,208	4,791	4,627	4,075	.....	4,351	4,203	4,278	4,195	4,499
Con. str. % of mortar str.	Average	63.4	71.2	63.2	65.7	73.1	.....	71.8	70.3	73.9	70.0	70.0
Comp. str. lb. per sq. in. "Lum." cement 1:2.75:4.35.	First	3,753	3,739	4,198	3,837	3,495	3,661	3,457	3,076	4,179	4,331	.....
	Second	3,696	3,852	3,587	3,636	3,368	3,554	3,940	3,395	3,759	4,197	.....
	Third	3,768	3,382	3,688	4,134	3,385	3,650	4,005	3,615	4,220	4,159	.....
	Total	11,217	10,973	11,473	11,607	10,248	10,865	11,402	10,086	12,158	12,687	.....
	Average	3,739	3,658	3,824	3,869	3,416	3,622	3,801	3,362	4,053	4,229	.....
Comp. str. lb. per sq. in. "Lum." mortar 6x12-in.	First	5,414	5,828	5,488	5,047	5,247	5,347	5,188	5,334	5,861	5,861	.....
	Second	5,217	5,211	5,052	5,177	5,203	5,260	5,634	5,294	5,861	5,861	.....
	Third	5,278	5,029	5,201	5,055	5,293	5,043	5,395	5,523	5,861	5,861	.....
	Total	15,909	16,068	15,741	15,279	15,743	15,650	16,217	16,151	17,583	17,583	.....
	Average	5,303	5,356	5,247	5,093	5,248	5,217	5,406	5,384	5,861	5,861	.....
"Lum." con. str. % of "Lum." mort. str. 6x12-in.	Average	70.5	68.3	72.9	76.0	65.1	69.4	70.3	62.4	69.2	72.2	.....
Comp. str. lb. per sq. in. "Lum." mort. 2x4-in. cyls.	First	5,286	5,639	5,560	6,265	5,488	5,548	5,293	5,332	6,890	6,890	.....
	Second	5,557	5,169	4,981	5,106	5,408	6,217	6,319	5,332	6,890	6,890	.....
	Third	5,487	4,907	5,242	6,174	5,511	5,556	6,319	5,332	6,890	6,890	.....
	Total	16,330	15,715	15,783	17,545	16,407	17,321	17,931	15,996	20,670	20,670	.....
	Average	5,443	5,238	5,261	5,848	5,469	5,774	5,977	5,332	6,890	6,890	.....
"Lum." con str. % of "Lum." mort. str. 2x4-in. cyls.	Average	68.5	69.8	72.7	66.2	62.5	62.8	63.6	63.1	58.7	61.4	.....
Loss L. A. rattler test.		29	28	32	....	46	40	38	39	43	18	12

est results, the steel punching specimens higher results, and the rock aggregate specimens considerably higher results.

"Lumnite" cement mortar was mixed in proportions of 1 part cement to 2.75 parts sand with a water cement ratio of 0.85 and a slump of 6½ in. Results below are averages of three 6x12-in. cylinders in aggregate specimens with three 2x4-in. cylinders in mortar. Aggregates mixed with mortar in



Cost of materials per cu. ft. of concrete of various mixes and varying voids in coarse aggregate based on cement at 50c per sack, sand and rock with sp. gr. of 2.60 at $1 and $1.50 per ton, respectively


WEIGHT IN HUNDRED LBS PER CU YD. OF CONCRETE
ROCK CURVE FOR 1:3:5 MIX
ROCK CURVE FOR 1:2:4 MIX
ROCK CURVE FOR 1:2:3½ MIX
ROCK CURVE FOR 1:1½:3 MIX
ROCK CURVE FOR 1:1:2 MIX
SAND CURVE FOR 1:3:5 MIX
SAND CURVE FOR 1:2:3½ MIX
SAND CURVE FOR 1:2:4 MIX
SAND CURVE FOR 1:1½:3 MIX
SAND CURVE FOR 1:1:2 MIX
SACKS OF CEMENT PER CU YD OF CONCRETE
1:1:2 MIX
1:1½:3 MIX
1:2:3½ MIX
1:3:5 MIX
1:2:4 MIX
PERCENTAGE OF VOIDS IN COARSE AGGREGATES

Quantities of materials per cu. yd. of concrete for various mixes and varying percentages of voids in coarse aggregates, based on sand and rock having sp. gr. of 2.60 and the sand having a void content of 45%

ratio of 1:2.75:4.35, mixing, curing and testing, were in conformity with A.S.T.M. methods.

	Mortar	1:2.75:4.35	Per cent
Cork aggregate	6936	895	12.8
Steel punchings	6936	2540	36.6
Rock (quarried trap)	6890	4229	61.4

From the foregoing examples it is therefore evident that the aggregates do play some part in the strength of concrete, and in many instances probably rather substantial parts. It would seem just as preposterous to assume that all aggregates that are clean and sound would produce uniform results when it is common knowledge that all commercial cements exceed the specified strength tests by comfortable margins. This variation is considerable with any one brand and at times becomes even larger when comparing tests on different brands used in the same locality and under similar conditions. There is no desire to in any way detract from the value of the water-cement ratio theory which most assuredly marks a distinct step in advance, but it is desired to point out that blind adherence to such a theory is not confirmed by practice and induces factors which may produce results either considerably above or below those expected in the computations. Study should be made not only as to the physical character of the coarse aggregate, but also as to the effect of the shape of the several particles on the results. The activities of the National Crushed Stone Association as well as public agencies have indicated that the shape of the particles influences the tensile strength of concrete substantially, and it is believed reasonable, particularly when supported by apparent verification in practice, to suppose that the shape of the particles has some influence on the compressive strength of the resulting concrete.

Another phase of the problem is encountered when a study is made of the effect of voids in cured concrete, assuming that the water-cement ratio theory is strictly true and that on unit density it would produce concrete of a given strength, then it is reasonable to suppose that if another sample of concrete using the same water-cement ratio but having a density of only 0.85 would have somewhat less strength. The above assumption of unit density is certainly hypothetical, as concretes can approach that as a limit but rarely exceed 85 to 90%, and this again brings up a variable which is met constantly in practice. If the above be true then the grading of the coarse and fine aggregate, which in turn affects the density of the mixed concrete, will be an influence on the results.

Now from the standpoint of an aggregate producer, what has all this to do with his business? This is a reasonable query and is simply answered. In concrete mixes the fine and coarse aggregates are used to produce economical volumes of concrete. Cement under ordinary circumstances being the most expensive ingredient used in the production of concrete therefore plays a very important part in the cost. For a given mix and given volume the closer graded coarse and fine aggregate mixtures will require less cement and therefore will be cheaper. In application this statement has more force in the richer mixtures than in the leaner ones. From this a reasonable conclusion can be drawn that in a competitive area the producer whose aggregates have the least voids will secure a distinct sales advantage over the producer with less filled material. Cases have been observed where on the basis of cost of concrete in place and assuming that the aggregates were selling at $2 a ton delivered, due to the tightness of grading of one aggregate on that particular piece of work, it would be worth 25 cents a ton more than the other aggregate, or a difference of 12½%. Viewing this from another angle, in much construction, there is considerable competition between structural steel and reinforced concrete. Economical aggregate mixtures will be reflected in lower unit costs of concrete, which in turn will have a tendency to increase the amount of reinforced concrete work done. Another benefit is therefore derived by the producer of filled aggregates. Still another advantage which may not be so apparent is that on a given job the producer of tightly filled aggregates will sell more rock and sand than one who

has looser mixtures which call for a higher cement factor.

These points can all be taken advantage of by every producer; and it is believed that forces playing upon the industry will gradually either eliminate or embarrass the producer who does not take advantage of them. It is true that general statements of truth are easily made, but often the application isn't simple. Producers should have a thorough study made of their product by a person understanding the problem from a practical standpoint. The necessary steps to introduce such regulations do not invariably increase costs, as, for example, a case handled by the writer in which the market demand was for 1-in. rock preponderantly requiring the reduction of a large proportion of the plant's production to that size. Studies of grading and reduction of voids on the product were made and an educational program among the architects and contractors in the area initiated, which resulted in an increased use of larger sized material, blended with the 1-in. product. This program accomplished two things—it caused the production of better graded materials and reduced crushing costs quite subtantially by reducing the proportion of the material that had to be reduced to the 1-in. size. Many cases occur where the reduced sales resistance, or decided sales advantages, produced profits not before realized; and it is believed that such a program will prove quite a distinct asset to any producer of aggregates.

Agricultural Limestone by the Train-Load to One Customer

By Walter B. Remley

Agricultural Agent, Chicago, Burlington & Quincy R. R., St. Louis, Mo.

BUYING AGRICULTURAL LIMESTONE in trainload lots has been initiated by G. C. Bauer, Bond county, Illinois, farmer, living near Smithville. Six hundred tons in a special train of ten cars was delivered on the right-of-way of the C., B. & Q. railroad just over the fence from Mr. Bauer's farm in August. He expects to spread it on 150 acres of his 400-acre farm at the rate of four tons per acre.

Immediately the reader will wonder what induced Mr. Bauer to bring in such a large quantity of limestone all at once. Just two things were responsible, according to Mr. Bauer; first, that he knew he needed the limestone, and that it would give him results; and, second, that the Burlington railroad could provide "between station" delivery for him. Had Mr. Bauer been obliged to haul his limestone from Smithboro, he probably would not have brought in more than one or two cars this fall, but delivered on the right-of-way at his farm, he figured that service saved him just a flat $175 over what it would have cost to move it from the station to the farm.

Now what of the man. Mr. Bauer is a real dirt farmer and is in his sixties. He started farming with practically nothing, immediately after his marriage, and has been highly successful. He has raised a family of seven, while paying for a 400-acre farm, which he now owns. While he has always been a good farmer and a good cooperator with Farm Advisor W. E. Foard, who has been in Bond County a number of years, he was not among the first men in the county to use limestone.

Farm Advisor Foard put on an intensive agricultural limestone campaign all over the county in 1925, and since then the county has been one of the largest users of agricultural limestone in Illinois. It was one of the first counties in the state to have agricultural limestone bins at the local railway stations.

Mr. Bauer for a number of years has made dairying one of the important activities of his farm. He is milking a herd of about 20 cows at the present time. His principal crops have been a rotation of corn, wheat, oats and clover. But like so many Middle West farmers he had reached the point where he was having difficulty growing good clover. He noticed how much better the clover of his neighbors who had used limestone was growing, so he fell in line and up to this spring had limed 70 acres.

Forty acres of this was in wheat in 1928. He seeded clover on it early in the spring and secured a fine stand. His dairy cows were pastured in it last fall and again early this spring. It was then plowed under and put in corn. The corn is now one of the best fields in the community. He also had 15 acres of additional second year clover, in which his 20 cows were pastured, and he says it about doubled their daily milk flow.

The only thing Mr. Bauer regrets is that he didn't start liming ten or fifteen years ago. "Had I done that, I'd be much further ahead financially than where I am now," he declared the day his special train of limestone was delivered. "I'm convinced," he continued, "that the present hope of my farm is to decrease the cost of production by increasing my yields, and that this can best be done by the use of agricultural limestone and clovers. The fact that I could also get it delivered right at my farm through the cooperation of the Burlington's Agricultural Department was also a great help and a big influence in my decision to bring in a whole trainload."

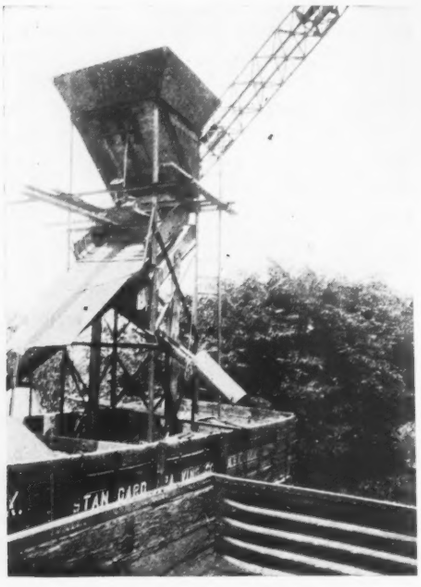
What Mr. Bauer has just done may become rather common in the Middle West during the next few years as more farmers are convinced of the worth and necessity of agricultural limestone, and since most of the carriers are now cooperating by furnishing "between station" delivery in special train lots where they can. There are a few farms in Illinois and other states, who have used more than ten cars of limestone in a single season, but so far as is known Mr. Bauer's special train of 600 tons is the largest individual shipment ever received in the Middle West at one time.

A special train of 10 cars, 600 tons of agstone, delivered to one farmer customer

Hints and Helps for Superintendents

Movable Screening Plant

THE PRICE Sand Co., Tulsa, Okla., has many operations along the Arkansas river. One of these plants, a dredging operation, uses a suction dredge that delivers

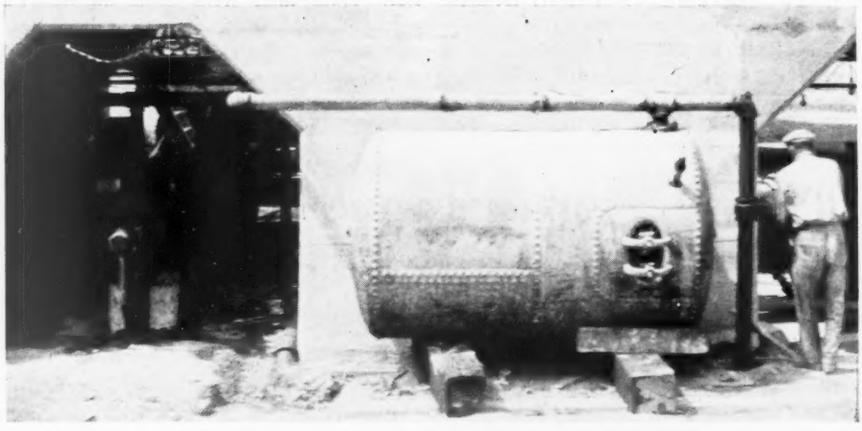


Movable screening plant mounted on gondola car

the sands to a concrete bin located on the river bank. A stiff-leg derrick with a clamshell bucket carries the sands from the bank to a small hopper, placed above a Hum-mer vibrating screen. The screen and hopper are mounted as a unit on a standard gage gondola car and so arranged that the oversize product falls into the bed of the car. The sand passed by the screen side discharges into a second gondola spotted alongside or to the ground below. In either event the clamshell can reclaim these materials for stockpiling or cars for immediate shipment. The entire screening plant can be shifted from place to place with the usual railroad equipment.

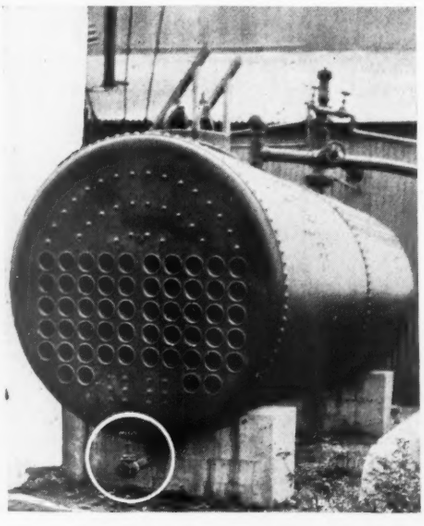
Compressor Explosions

AIR COMPRESSOR receivers don't blow up often, but when they do the results are often disastrous to life and property. The reasons for these explosions have been given at various times in ROCK PRODUCTS; in the main they are caused by allowing accumulations of oil to gather in the receivers through improper, or total lack, of receiver draining.



This air receiver has no drainage outlet!

The two receivers shown here are examples of those considered as dangerous; the horizontal receiver is totally lacking of *any* drainage outlet and the other horizontal receiver, although it has a drainage outlet, this has been *securely closed by a pipe plug.*

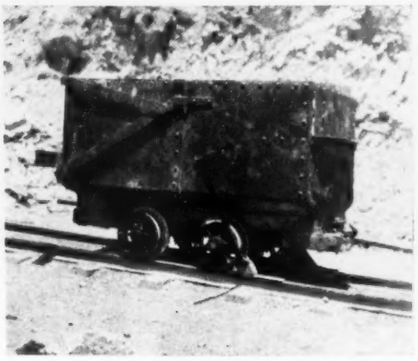


The plug screwed in tightly in the drainage outlet!

Operators having trouble as to the proper method of connecting and mounting air receivers will find several articles on this subject (see March 16, 1929, p. 83; August 28, 1929, p. 78, 79; September 14, 1929, p. 98).

Quarry Car Brake

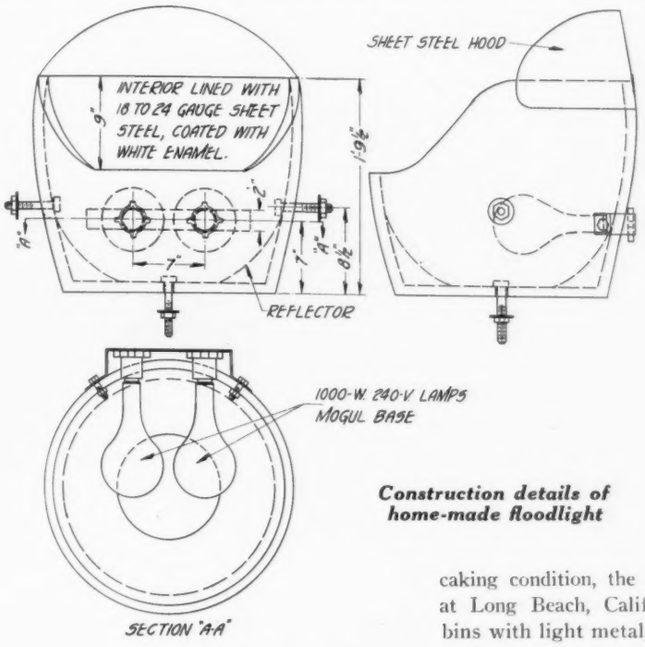
MAX ALTGELT, of the New Braunfels Limestone Co., New Braunfels, Texas, has developed an ingenious method of stopping the cars as they coast from the quarry to the foot of the incline serving the crushing plant. The stop is simply a piece of angle iron to which is fastened a handle as shown in the illustration. As the car comes speeding down the grade the operator holds the angle iron on the track in the position shown and the front wheel of the car rolls up on the angle iron, the operator letting go of the handle at that instant. The front wheel of the car with this brake under it cannot turn; the brake shoe and car slide along the rail a short distance and come to an easy stop. Mr. Altgelt has been using this device for years and has never derailed or damaged a car from ineffective braking.



Car stop in position under the front wheel of the quarry car

Home-Made 2000-Watt Floodlight

AN EFFICIENT 2000-watt floodlight, strictly homemade, is in service at the Monocacy plant of the John T. Dyer Quarry Co. The light was designed by W. A. Kelly, superintendent of the plant, who had need for one at a rush period when it was not possible to secure an extra standard light.



Construction details of home-made floodlight

In making the floodlight, Mr. Kelly took an empty grease barrel, burned the grease from it and then cut it so as to make two hoods as indicated on the accompanying sketch. The lights were mounted as shown and after connection to the line in the quarry proved so efficient that the company adopted the device for lighting its night quarry operations.

The cost of making the floodlights was quite small and its simplicity insures its adoption by other plants which may be faced with a similar predicament. As may be seen, there is no danger of small flying stone fragments breaking the glass, for there is no glass to break and the extended hood protects the bulbs.

Prevents Gypsum Caking in Bins

GYPSUM stucco, when it leaves the kettles, has a certain amount of water vapor occluded in the material and in the course of ordinary operation this is not all reabsorbed by the stucco before it reaches the main storage bins over the mixers. The amount of this free water vapor present will depend entirely upon the temperatures at that point, which unless artificial cooling is resorted to will range from 250 to 290 deg. F. in most plants.

In an ordinary bin the coolest part is the outer walls, naturally, and when an empty bin first receives hot stucco direct from the kettles this material is cooled and reabsorbs a higher percentage of water than that which follows, as some of this stucco loses water by contact with air currents, etc., and is carried away. This cycle of events is repeated every time the bin is drawn low, each time the outer wall coat gets more and more of the vapors until eventually this product will be found to contain as much as 15% water and to be badly caked.

The effect of this caked material on the fresh stucco when it occasionally caves and is drawn to the mixers with the fresh stucco is highly injurious to the quality of the product. To overcome this caking condition, the Standard Gypsum Co. at Long Beach, Calif., lined all its stucco bins with light metal, presenting a smooth surface and one which prevented the stucco from sticking to the sides or bottom of the bin; every time the bin was drawn empty every pound of stucco was readily drawn out. In this manner any tendency to cake is overcome for the cold stucco is not permitted to remain at a given point long enough to absorb sufficient water vapor to cake.

Air Preheater for Cement Kiln

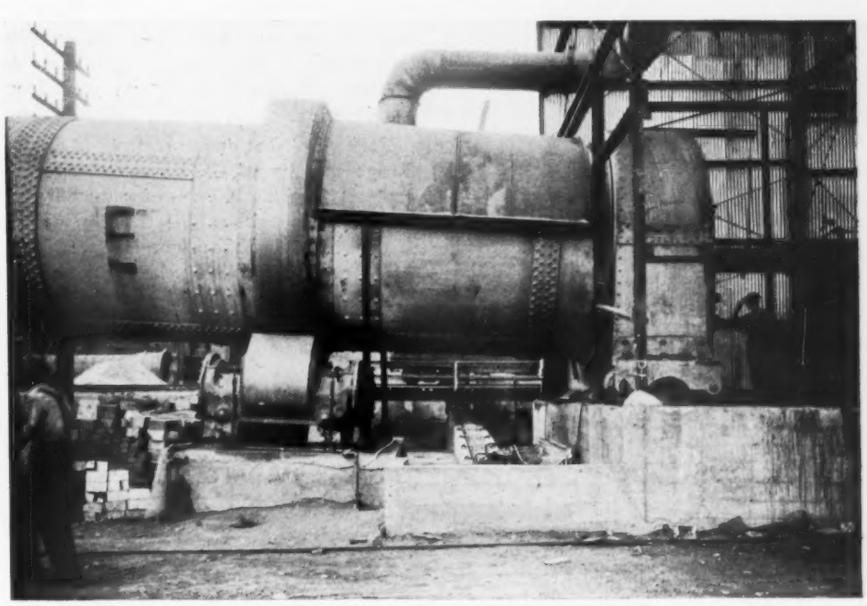
FOR ECONOMIC reasons, a preheated air supply for the burners in rotary kiln operations is desirable, but it is not often so simple a matter as it would seem. If hot gases from the kiln are taken direct there is apt to be so much dust present that combustion is hindered and this factor may necessitate the installing of expensive dust collecting systems capable of handling the hot gases. Again if natural gas or pulverized coal is used for fuel, pre-combustion of the fuels before they arrive at the burner may occur.

At the Pocatello, Idaho, plant of the Idaho Portland Cement Co. warm air is supplied to the burners from a metal shield placed over the upper half of the discharge end of the kiln as shown in the illustration. This shield is connected with a suitable fan for delivery of the air to the burners.

A somewhat similar method of securing heated air was observed in the new Republic Portland Cement Co. plant at San Antonio, Texas. At that place warm air is being taken from the ceiling of the room in which the coolers are to be operated. At the Houston, Texas., plant of the Trinity Portland Cement Co. hot air for the kilns is to be taken from the kilns proper and dust collectors were being installed to free this air from any entrained dust.

Mounting and Care of Ball Bearings

ACTING ON the consideration that best service from ball bearings can be obtained only when properly mounted and cared for, some simple institutions along this line are given in the August, 1929 issue of the *Dragon*, published by the Fafnir Bearing Co., New Britain, Conn.



Metal housing over the hot end of a rotary cement kiln to secure a supply of warm air for combustion

Still Lower Cement Prices for the San Gabriel Dam Job

CEMENT at $1.545 per barrel for 3,442,000 bbl., delivered at the site, is the lowest bid reported for the big San Gabriel dam job, near Los Angeles, Calif., in the bids opened September 10. This is the practical equivalent of cement at $1.225, f.o.b. mill. But the bidders, Ross and Kahn, two of the contractors for the work of building the dam, propose to bring clinker to the dam site and grind it there, taking advantage of a lower freight rate and minimizing losses in transport.

The clinker is to be furnished by the Southwestern Portland Cement Co., which has a plant at Victorville, Calif., and which did not put in a bid. This company was the lowest bidder in the previous bidding, about two weeks earlier, when it offered cement for $1.72 delivered at Azusa, the nearest station to the dam, or $1.40 mill price. This bid was rejected on account of a protest from the Riverside and the California Portland Cement Companies, which claimed that the specifications were illegal because they specified that the cement must comply with A.S.T.M. standards, which might be changed by the A.S.T.M. before the deliveries had been completed. Legal advisors of the County Board of Supervisors sustained this protest.

The protesting companies did not bid at the previous bidding but at this bidding they offered cement at $1.28 at the mills at Riverside and Colton. This is a joint bid of the two companies, who also made a joint bid of $1.56 for cement delivered at Azusa.

The lowest mill price bid was that of J. Fred Larson, of San Francisco, who calls himself an "international trade counsellor." His bid was $0.78 per barrel, f.o.b. Antwerp, Belgium.

It is expected that legal complications will follow. According to local papers, the board will be asked to consider the lowest mill price before accepting any bids, as the mill price as well as the delivered price was asked for.

There are other complications. One is the proposal of Glenn Morgan, representing Eastern capital (unspecified) who proposes to build a new plant at Little Rock, 15 miles from the dam site and supply cement at $1.53 plant, or $1.62, delivered. He proposes to deliver the cement by an aerial tramway, which his company will build over the mountains. The argument for accepting his bid is that the plant will be in Los Angeles county, which has no cement plant in its limits although it is said to use more cement than any other county in the country. Rex Goodcell, Morgan's attorney, told the board that the county would get more out of taxes on the new plant than the difference between his company's bid and the lowest bid.

Another complication comes from the proposal of E. C. Eaton, flood control engineer, to substitute ground silica for 30% of the cement. According to the *Los Angeles Times*, he claims that this mixture will make "a better hydraulic concrete" than cement alone, which is probably to be interpreted as a more nearly impervious concrete. It is said that ground silica (fineness not given) can be furnished at Azusa for $5.76 per ton. The same paper calculates that a saving of $240,000 can be made by substituting silica for 30% of the cement.

Whether this proposal to use 30% of silica has been seriously made or is a part of the newspaper campaign that has been carried on to get as low a price as possible can only be conjectured. This campaign has been going on for some months and has included a state senatorial investigation, threats of building a county plant and innumerable columns of newspaper propaganda directed against a supposed or alleged "cement trust." The bids received in this and the previous bidding should be a sufficient answer to those who claim that there is any collusion or price fixing agreement among the cement manufacturers in the southern part of the state.

Louisiana Governor Boasts How He "Broke the Cement Market"

THE FOLLOWING NEWS ITEM from the *New Orleans* (La.) *Times-Picayune* we do not consider very creditable to the state of Louisiana or the portland cement industry, which was the victim. The governor may figure he has "made a profit" of some million dollars, but we dare say he has done several millions of dollars' damage to the business of building supply dealers in Louisiana and the producers of portland cement in his own and border states. We reprint this in the hope that producers of building materials generally may profit from the experience:

Following the announcement in Baton Rouge recently of the consummation of a contract for 2,800,000 bbl. of cement by the Highway Commission for the program of state road paving, Governor Huey P. Long issued a statement in which he asserted the state had been saved more than $1,000,000 under the current market price in the purchase.

The contract is for cement to be used in the next two and a half years of road construction.

The signing of the contract and Governor Long's statement disclosed that the announcement a month ago that the entire amount had been awarded to the Lone Star Cement Co., of New Orleans, Louisiana, was premature. How that tentative contract was used to obtain better prices is explained in Governor Long's statement. It follows:

"In its last cement contract, only completely wound up today, the Louisiana Highway Commission has realized a profit to its road building of over $1,000,000.

"The commission tried the experiment of advertising for its needs for the next eighteen months by calling for bids on 2,800,000 bbl. of cement. By buying direct they made the original dealer's profit of 10 cents per barrel, or $280,000. Contrary to all precedent, the amount of cement broke the cement market for the first time in modern history and instead of all to cement concerns bidding the same, the Lone Star Cement Co. offered to undersell its competitors by an additional 10 cents per barrel. This made the commission another $280,000.

"As a result of the crisis, the cement market broke throughout the United States.

"The Highway Commission then took advantage of its understanding and agreement to negotiate further on the price and terms. It first secured an extension in the discount period on cash payments from 15 to 22 days. It then secured a clause guaranteeing practically a 100% return on all cement sacks at 10 cents per sack; there are four to the barrel. These two concessions conservatively amount to another 10 cents per barrel profit, or another $280,000.

"Then, the commission managed to secure a further reduction under the market of 5 cents per barrel, or another $140,000.

"The commission previously had placed an order for 700,000 bbl. at the prevailing market. By forcing the market down on its large bid, the cement companies met the reduction on our guaranteed price clause in the cement already bought, giving us thereby another sum of $105,000.

"Today authorities of other states, including one of the Carolinas, telephoned our commission for particulars on how we managed to secure such a cement contract so that they might adopt similar processes."

Less than a month ago, it was announced by O. K. Allen, chairman of the commission, that the entire order, amounting to approximately $6,000,000, had been awarded to the Lone Star Cement Co., New Orleans, at prices ranging from $2.12 to $2.48 a barrel. However, it was later stated that that contract had never been signed, and that the commision availed itself of the right to further negotiate with the bidding companies. As a result the Lone Star's bid was met by the competing firms and further reduced 5c. a barrel. The split contracts resulted.

The companies which will supply the cement as needed, under the commission's direct purchase plan, at $2.07 to $2.43 a barrel, are: Lone Star Cement Co., New Orleans, 974,000 bbl.; Atlas-Portland Cement Co., Birmingham, 502,000 bbl.; Lehigh-Portland Cement Co., Birmingham, 500,000 bbl.; Oklahoma-Portland Cement Co., Oklahoma City, 503,000 bbl., and Trinity Portland Cement Co., Dallas, Tex., 409,000 bbl. —*New Orleans* (La.) *Times-Picayune*.

Editorial Comment

May Be and May Be Not

Under the caption "Cement Didn't; Lumber, Brick Did," the *Business Week*, successor to the *Magazine of Business*, September 14, has an editorial squib on the recent "sensational tumble" of portland cement prices in the principal markets in the East. The point made is that faced with a large over-capacity the cement manufacturers have failed to hold down production, and have let this overproduction ruin the market. Lumber and brick manufacturers, on the other hand, are said to have cut production to meet a similar situation.

Of course, over-capacity is behind the present portland cement situation, but it is not the whole of the story. Up to this time portland cement manufacturers, or most of them at least, have met the situation intelligently and have kept production somewhere near within bounds. The statistics for August, published elsewhere in this issue, show that while stocks on hand August 31 were slightly more than at the same time last year the *production* for August was nearly 1% less than for August, 1928, in spite of the considerable increase in shipments during August, 1929, as compared with August, 1928, and in spite of the increase in producing capacity during the past year.

The real reason for the recent price slashing, we are inclined to believe, is a want of ethics on the part of a few producers. It is, in all probability, the old story of secret rebates—an attempt to hide price-cutting, in spite of the fact that every business man in this day and generation ought to know such price-cutting just can't be hidden.

It is a fair policy and a fixed principle with several large producers to give all their customers the benefit of any price-cut; so that, aside from the ethics involved, it is exceedingly dangerous to the business of any producer to indulge in such price discrimination, no matter how important some particular business may seem to him at the moment.

The logical and orderly course for the cement industry to have pursued under the conditions, it seems to us, was a slow paring down of prices, if necessary, as capacity increased, until demand picked up, or until the weak sisters were eliminated. Elimination in this way is a natural process—it might be actual elimination or it might be an absorption of some of the weaker producers by the stronger ones. In any event it would not do serious and violent injury to the entire industry, that will be hard to repair. The present crisis, of course, involves the innocent bystander as well as the combatants, which is unjust and to the advantage of no one.

The *Business Week* suggests as a cure a United States Cement Corporation which will dominate the industry. May be and may be not. Mergers are not the only cure; and they are not even a proved cure. And in the case of a localized industry like portland cement it is very questionable if even a United States Cement Corp. could dominate very long in all markets. In the present situation some of the little fellows seem to be holding their own quite as well as the big ones. We are inclined to believe that a more unanimous practice of what are now considered *ordinary* business ethics and sound common sense would be equally or more effective.

Wainwright Evans, telling a little story on "Fair Play in Business" in the August issue of the *Nation's Business*, makes his character say: "'Most business men feel the impulse [to be fair and even generous], but they can't usually afford it. The same thing is true all along the line in business ethics. Few business men indulge in shady business practices because they like to. They do certain things because their competitors do them; and their competitors do them because *they* do them.

"'Unethical conduct in business is largely the result of conditions which make practical ethics too expensive when they are individualistic rather than collective. I think business men are about as honest as they can afford to be.'

"The import of that story goes deep," Mr. Evans continues. "What is needed in business today is a way by which individual business men can afford to do what is right. How can business men be made free to be good?

"Perhaps the answer lies in the strong tendency toward organization and concerted mass action in industry which has come into existence in the last 25 years. The way to an intense individualism and to an intense freedom to do right may be to create, as a foundation for it, a mass morality which would deprive men, by common consent, of freedom to indulge in wrong practices.

"This, perhaps, is one of the more significant aspects of the present growth of all sorts of commercial organizations.

"Everybody more or less disarms; and the man who wants to discard his weapons and resort to policies of decency and fair play can do it safely. Only under such conditions can the individual follow his bent and act by the code of a gentleman."

It is discouraging to see producers in an industry such as portland cement, who have been so long and so admirably organized to work together for their common benefit, become suddenly subject to a breach of such ethical practices and understanding. Wouldn't it have been more profitable, as well as more ethical, to have tried once more to whisper wise counsel and show the erring brother the path of righteousness rather than to try to kick him off the lot? For patience conquers all things!

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	9-25-29	91	93	
Alpha P. C. new com.	9-23-29	44	46	75c qu. Oct. 15
Alpha P. C. pfd.	9-23-29	116	.....	1.75 Sept. 14
American Aggregates com.[29]	9-25-29	.....	44	75c qu. Mar. 1
Amer. Aggregate 6's, bonds	9-24-29	95	.....	
American Brick Co., sand-lime brick	9-23-29	.....	17	25c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	9-23-29	.....	78	50c qu. Aug. 1
Am. L. & S. 1st 7's[28]	9-25-29	96	99	
American Silica Corp. 6½'s[49]	9-25-29	95	100	
Arundel Corp. new com.	9-24-29	44½	.....	50c qu. Oct. †
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	9-25-29	80	90	
Atlas P. C. com.	9-23-29	47	49	50c qu. Sept. 3
Beaver P. C. 1st 7's[20]	8-23-29	98	101	
Bessemer L. & C. Class A[4]	9-23-29	33	34	75c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	9-23-29	94	96	
Bloomington Limestone 6's[29]	9-25-29	87	91	
Boston S. & G. new com.	9-23-29	19	23½	40c qu. July 1
Boston S. & G. new 7% pfd.	9-23-29	49	52½	87½c qu. July 1
Calaveras Cement 7% pfd.	9-20-29	88	88½	
Calaveras Cement com.	9-20-29	19⅞	20	
Canada Cement com.	9-23-29	26	.....	
Canada Cement pfd.	9-23-29	.....	97	1.62½ qu. Sept. 30
Canada Cement 5½'s[43]	9-21-29	98½	99¼	
Canada Cr. St. Corp. 1st 6½'s[32]	9-20-29	97	100	
Canada Gyp. & Alabastine	9-23-29	.....	124	75c qu. July 2
Can. Gyp. & Alabastine (new).	9-23-29	29	29½	37½c Oct. 1
Certainteed Prod. com.	9-24-29	27¾	28¾	
Certainteed Prod. pfd.	9-24-29	74	76	1.75 qu. Jan. 1
Cleveland Quarries new st'k	9-23-29	64	67	50c&25c ex. Sept.1
Columbia S. & G. pfd.	9-23-29	86½	90	
Consol. Cement 1st 6½'s, A[42]	9-25-29	90	95	
Consol. Cement 6½% notes[24]	9-25-29	85	90	
Consol. Cement pfd.[29]	9-25-29	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	9- 4-29	100½	102	
Consol. Rock Prod. com.[9]	9-21-29	.....	10	
Consol. Rock Prod. pfd.[30]	8-23-29	.....	23	
Consol. Rock Prods. units[26]	7-27-29	52	53	
Consol. S. & G. com. (Can.)[48]	9-21-29	No market		
Consol. S. & G. pfd. (Can.)	9-23-29	90	93	1.75 qu. Aug. 15
Construction Mat. com.	9-24-29	21	21¾	
Construction Mat. pfd.	9-24-29	42½	42¾	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	9-21-29	95	98½	
Coosa P. C. 1st 6's[29]	9-25-29	48	53	
Coplay Cem. Mfg. 1st 6's[40]	9-23-29	90	.....	
Coplay Cem. Mfg. com.[40]	9-23-29	10	.....	
Coplay Cem. Mfg. pfd.[40]	9-23-29	70	.....	
Dewey P. C. 6's[30] (1930-41)	9,25-29	96	.....	
Dewey P. C. 6's[30]† (1942)	9-25-29	100	.....	
Dolese & Shepard	9-24-29	114	118	$2 qu. Oct. 1
Edison P. C. com.[39]	9-23-29	10c	.....	
Edison P. C. pfd.[39]	9-23-29	25c	.....	
Giant P. C. com.[25]	9-20-29	25	38	
Giant P. C. pfd.[35]	9-20-29	25	38	3½% s.-a. June 15
Ideal Cement, new com.[33]	9-21-29	60	64	75c qu. July 1
Ideal Cement 5's, 1943[33]	9-21-29	95	98	
Indiana Limestone units[29] (5 shs. com. & 1 sh. pfd.)	9-25-29	No market		
Indiana Limestone 6's	9-24-29	76½	80	
International Cem. com.	9-24-29	68	68½	$1 qu. Sept. 27
International Cem. bonds 5's	9-24-29	95	97	Semi-ann. int.
Iron City S. & G. bonds 6's[48]	9-20-29	85	90	
Kelley Is. L. & T. new st'k	9-23-29	48	55	62½c qu. Oct. 1
Ky. Cons. St. com. Voting Trust Certif.[48]	9-19-29	13	14	
Ky. Cons. Stone 6½'s[48]	9-19-29	96	100	
Ky. Cons. Stone pfd.[48]	9-19-29	90	95	
Ky. Cons. Stone com.[48]	9-19-29	13	14	
Lawrence P. C.	9-23-29	50	75	2% qu. June 29
Lawrence P. C. 5½'s, 1942	9- 6-29	85	90	
Lehigh P. C.	9-24-29	41½	43	62½c qu. Nov. 1
Lehigh P. C. pfd.	9-24-29	107¼	107½	1¾% qu. Oct. 1
Louisville Cement	9-23-29	250	.....	
Lyman-Richey 1st 6's, 1932[13]	9-20-29	96	99	
Lyman-Richey 1st 6's, 1935[13]	9-20-29	95	98	
Marblehead Lime 6's[14]	9-20-29	98	100	
Material Service Corp.	9-24-29	32½	33	50c qu. Sept. 1
Medusa Portland Cem.[29]	9-25-29	120	125	1.50 Oct. 1
Mich. L. & C. com.[6]	9-21-29	35	.....	
Missouri P. C.	9-24-29	40	40¾	50c qu. Aug. 1
Monolith Midwest[9]	9-21-29	8½	10	
Monolith bonds, 6's[9]	9-21-29	97	98	
Monolith P. C. com.[9]	9-21-29	14	14½	40c s.-a. July 1
Monolith P. C. pfd.[9]	9-21-29	9	9½	40c s.-a. July 1
Monolith P. C. units[9]	9-21-29	32	33½	
National Cem. (Can.) 1st 7's[29]	9-25-29	97	100	
National Gypsum A com.	9-24-29	14	15	
National Gypsum pfd.	9-24-29	54	58	
Nazareth Cem. com.[26]	9-20-29	20	25	
Nazareth Cem. pfd.[26]	9-20-29	97	103	
Newaygo P. C. 1st 6½'s[29]	9-25-29	101½	103	
New Eng. Lime 1st 6's[14]	9-20-29	94	96	
N. Y. Trap Rock 1st 6's	9-24-29	95¾	.....	
North Amer. Cem. 1st 6½'s	9-24-29	57	58	
North Amer. Cem. com.[29]	9-25-29	.....	7	
North Amer. Cem. 7% pfd.[29]	9-25-29	26	32	1.75 qu. Aug. 1
North Amer. Cem. units[29]	9-25-29	.....	36	
North Shore Mat. 1st 5's[15]	9-25-29	96	.....	
Northwestern States P. C.[37]	7-26-29	140	.....	
Ohio River Sand com.	9-23-29	28½	30	
Ohio River Sand 7% pfd.	9-23-29	100	102	
Ohio River S. & G. 6's[16]	9-23-29	90	95	
Pac. Coast Agg. 6½'s	8-29-29	99	.....	
Pac. Coast Agg. 7's	8-29-29	99	.....	
Pac. Coast Cem. 6's, A[5]	9- 6-29	.....	95	
Pacific Lime Co. pfd.[43]	9- 6-29	No market		
Pacific P. C. com.	9-20-29	26	27½	
Pacific P. C. pfd.	9-20-29	.....	85	1.62½ qu. July 5
Pacific P. C. 6's[9]	9- 6-29	94½	100	
Peerless Egyp'n P. C. com.[21]	9-23-29	2½	3½	
Peerless Egyp'n P. C. pfd.[21]	9-23-29	85	90	1.75 July 1
Penn-Dixie Cem. 1st 6's	9-24-29	72	72¼	
Penn-Dixie Cem. pfd.	9-24-29	40⅛	45	1.75 qu. Sept. 15
Penn-Dixie Cem. com.	9-24-29	9	9½	
Penn. Glass Sand Corp. 6's	9- 6-29	101	103	
Penn. Glass Sand pfd.	9- 6-29	113	115	
Petoskey P. C.	9-23-29	9¾	10½	1½% qu.
Riverside P. C. com.	9-20-29	.....	30	
Riverside P. C. pfd.[9]	9-21-29	96	.....	1.50 qu. Aug. 1
Riverside P. C., A[9]	9-21-29	16	18	31¼c qu. Aug. 1
Riverside P. C., B[9]	9-21-29	5	.....	
Santa Cruz P.C. 1st 6's, 1945	9-20-29	108½	.....	6% annual
Santa Cruz P. C. com.	9-20-29	95	.....	$1 qu. Oct. 1
Schumacher Wallboard com.	9-20-29	13½	14½	
Schumacher Wallboard pfd.	9-20-29	23½	26½	50c qu. Aug. 15
Southwestern P. C. units[44]	9- 5-29	275	.....	
Standard Paving & Mat. (Can.) com.	9-23-29	31	32	50c qu. Aug. 15
Standard Pav. & Mat. pfd.	9-23-29	92	.....	1.75 qu. Aug. 15
Superior P. C., A	9-20-29	41¼	43	27½c mo. Sept. 1
Superior P. C., B	9-20-29	20	22½	
Trinity P. C. units[37]	7-26-29	142	150	
Trinity P. C. com.[37]	7-26-29	51	.....	
Trinity P. C. pfd.[29]	9-25-29	110	115	
U. S. Gypsum com.	9-24-29	83¼	84	2% qu. Sept. 30
U. S. Gypsum pt. paid	9-24-29	78	80	
U. S. Gypsum pfd.[29]	9-25-29	124	127	1¾% qu. Sept. 30
Universal G. & L. com.[3]	9-25-29	5oc	1¼	
Universal G. & L. pfd.[3]	9-25-29	9	12	
Universal G. & L., V.T.C.[3]	9-25-29	No market		
Universal G. & L. 1st 6's[3]	9-25-29	50	.....	
Warner Co. com.	9-23-29	50¾	54¾	50c qu., 50c ex. Oct. 15
Warner Co. 1st 7% pfd.[16]	9-23-29	100	105	1¾% qu. Oct. 1
Warner Co. 1st 6's[8]	9-25-29	99	.....	
Whitehall Cem. Mfg. com.[36]	9-21-29	125	.....	
Whitehall Cem. Mfg. pfd.[36]	9-21-29	98	.....	
Wisconsin L. & C. 1st 6's[15]	9-25-29	95	.....	
Wolverine P. C. com.	9-24-29	5	6	15c qu. Aug. 15
Yosemite P. C., A com.[9]	9-21-29	5	6	

†$484,000 called for redemption at 103½ October 1.

[1]Quotations by Watling Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler Beadling & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Dillon, Read & Co., Chicago, Ill. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Peters Trust Co., Omaha, Neb. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co., of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Hemphill, Noyes & Co., New York City, N. Y. [23]Blair & Co., New York and Chicago. [24]A. B. Leach & Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [32]A. E. Ames & Co., Toronto, Can. [33]Boettcher Newton & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Inc., Los Angeles, Calif. [45]Taylor Ewart & Co. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pfd., 13 sh.[6] (par 25)	24	.....
Atlantic Gypsum Products[5] com., 200 shares	$2 per share	.....
International Portland Cement Co., Ltd., pfd.	30	45
Rockland & Rockport Lime Co. 2nd pfd.[7] 13½ sh.	2⅞ per share	.....
Rockland & Rockport Lime Co. com.[7] 14½ sh.	55c per share	.....
Seaboard P. C.[1] 6% bonds ($7,500) 7-1-27. July, 1910, and subsequent coupons attached	$10 for the lot	.....
Southern Phosphate Co.[6]	1¼	.....
Universal Gypsum com. free stk.[1] 300 shares	$75 for the lot	.....
Universal Gypsum com.[1] 153 shares (no par)	$51 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Winchester Rock Brick Co., pfd., 1 share (par $25) and 1 share com. (par $10)[6]	$8 for the lot	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [6]Price obtained at auction by Wise and Arnold, Boston, Mass., June 19, 1929. [7]Price obtained at auction by R. L. Day & Co., August 21, 1929.

Lehigh Portland Cement Co. Earnings

EARNINGS of the Lehigh Portland Cement Co. for the year ended August 31 are reported as follows:

	1929	1928
Net income after depreciation, federal taxes, etc.	$3,676,051	$3,814,393
Earnings per share on 450,348 shares common stock (par 50)	$4.81	$5.07

After provision for federal income tax and depreciation, the net earnings of the company available for dividends on outstanding preferred and common stock for the year ended May 31, 1929, were $4,108,568.

After deduction of preferred dividends paid there was available for dividends on outstanding common stock $2,587,182, or $5.74 per share.

Alpha Portland Cement Co. Earnings

THE DIRECTORS of the Alpha Portland Cement Co. at a meeting held on Wednesday, September 11, 1929, declared a dividend of 75 cents per share on the outstanding common stock payable October 15, 1929. The net earnings after provision for federal taxes for the eight months of this year are $1,384,938.39 compared with $1,713,323.56 in the same period in 1928. This reduction is caused chiefly by a reduction in shipments of about 14% as compared with last year. Dividends declared this year, not including the one to be paid October 15, 1929, amount to $1,171,500. It is the expectation of the management that earnings for the balance of the year will be more than sufficient to take care of the dividend to be paid in October. It is also their expectation under present conditions that earnings for 1930 will be about $1,000,000. The preferred stock dividend requires $140,000 per year. Due to the very good financial condition of the company, earnings in excess of this sum will be available for distribution to the holders of the 711,000 common shares outstanding.

Medusa Merger Completed

FINAL negotiations connected with the merging of the Manitowoc Portland Cement Co., with plant in Manitowoc, Wis., Newaygo Portland Cement Co., plant at Newaygo, Mich., and Medusa Portland Cement Co., plants at York, Penn., Baybridge and Toledo, Ohio; Dixon, Ill., and Wampum, Penn., with the Medusa Portland Cement Co., with headquarters at Cleveland, Ohio, are reported to be completed. Details of the merger plan and stockholders approval of the same, published in earlier issues of ROCK PRODUCTS, contain data on the financial structure of the Medusa company and other facts.

Plants in the merger will retain their own trademark for products, it is stated. J. B. John, vice-president and general manager of the Newaygo company, was elected president and general manager and a member of the board of the Medusa company some time ago, before negotiations for the merger were opened. Clay H. Hollister of Grand Rapids, president of the Newaygo Portland Cement Co.; L. E. Geer of Chicago, vice president, and Charles C. West of Manitowoc, Wis., a director, will become directors of the Medusa company.

Additional details regarding the plan of merger indicate that the Medusa company has acquired a large part of both the outstanding common and preferred Newaygo stock. The exchange was on the basis of one and three-fourths shares of Medusa common for one share of Newaygo common and by the exchange share for share of Medusa Series A 6% preferred for Newaygo 7% cumulative preferred. The $445,000 outstanding 7% preferred stock of the Newaygo will be taken up in an issue of 6% Medusa company preferred stock. Medusa common has been paying dividends at the rate of $6 per share annually with an occasional extra dividend in cash or stock, and Newaygo common $8 per share.

Arundel Corporation Net

THE Arundel Corp., Baltimore, Md., sand and gravel producer, reports for the eight months ended August 31 net income of $1,633,439, after charges, equivalent to $3.32 a share on the 492,556 shares of no par common capital stock outstanding. This compares with $1,090,678, or $2.21 a share on the same common capital share basis in the similar period of 1928. Net income for August was $157,518, compared with $127,119 in August, 1928.

Kentucky Consolidated Stone Exchanges Certificates

HOLDERS of block collateral trust certificates of stock in the Kentucky Consolidated Stone Co., Louisville, Ky., may now exchange the same for certificates of preferred and common stock as follows: For every share of stock represented by block collateral trust certificate, will be given, in exchange, certificate for an equivalent number of shares 7% cumulative preferred stock and voting trust certificate for an equivalent number of shares common stock.

Called for Redemption

DEWEY PORTLAND Cement Co. first mortgage 6s "A" 1942, in the amount of $484,000, have been called for redemption at 103½ as of October 1. The 6s of 1930, entire series, were called for redemption at 102 as of September 1.

Ship Canal Portland Cement Manufacturers, Ltd., Report

THE net profit for the year ending March 31, 1929, was £137,741 (compared with £138,708), which with £38,662 brought forward made an available balance of £176,404. A dividend was declared of 8%, less tax, on the ordinary shares, absorbing £80,000; depreciation absorbed £40,000, leaving £33,153 to be carried forward. During the last three years costs had been materially reduced, and sales had increased by nearly 50%. Speaking of the progress of the Red Triangle Group, O. J. S. Pipes, chairman of the board, said when he became chairman of the Group the controlled output was less than 200,000 tons per year. Now the production was over 1,000,000 tons per year. Further, the capitalization per ton of this substantial output was a good deal lower than that of the principal competitors. The chairman then dealt with the scheme which had been evolved for the amalgamation of all the companies of the Red Triangle Group. The company will be known as the Allied Cement Manufacturers, and will control Greaves, Bull & Lakin, the Holborough Cement Co., Ltd., Dunstable Portland Cement Co., and Smeed Dean & Co., Ltd. The capacity of the works controlled by the company will amount to over 1,000,000 tons of cement per year.—*Chemistry and Industry.*

Warner Company Extra

THE WARNER CO., Philadelphia, Penn., producers of sand, gravel and other building materials, has declared an extra dividend of 50 cents and regular quarterly dividend of 50 cents on common, both payable October 15 to stock of record September 30.

The Warner Co. reports for five months ended August 31, 1929, surplds of $696,548, after interest, depreciation, depletion, federal taxes and dividends on first and second preferred stocks. This is equal to $3.43 a share on 203,000 no-par shares of common stock. In August surplus after all charges and preferred dividends was $138,040.

Recent Dividends Announced

Alpha P. C. com. (qu.)	75c,	Oct. 15
Arundel Corp. (qu.)	50c,	Oct. 1
Canada Cement pfd. (qu.)	1⅝%,	Sept. 30
Canada Gypsum and Alabastine (new)	37½c,	Oct. 1
Coronet Phosphate	$1.00,	Oct. 1
Dolese and Shepard (qu.)	$2.00,	Oct. 1
Kelley Island L. & T. (qu.)	62½c,	Oct. 1
Lehigh P. C. com. (qu.)	62½c,	Nov. 1
Monarch Cement Co.	4%,	Oct. 15
Medusa P. C. com. (qu.)	$1.50,	Oct. 1
Medusa P. C. pfd. (qu.)	$1.50,	Oct. 1
Material Service Corp. (qu.)	50c,	Sept. 1
Santa Cruz P. C. (qu.)	$1.00,	Oct. 1
Superior P. C. (qu.)	27½c,	Sept. 1
Warner Co. 1st pfd. (qu.)	$1.75,	Oct. 1
Warner Co. com. 50c ext. and qu. div.	50c,	Oct. 15

Foreign Abstracts and Patent Review

Reactions in Shaft Kilns. According to Kuehl, there is the possibility of these six fundamental reactions between the substances under consideration:

(1) $2C + O_2 = 2CO$ (not reversible).
(2) $C + O_2 = CO_2$ (not reversible).
(3) $2CO + O_2 = 2CO_2$ (reversible; see 4).
(4) $2CO_2 = 2CO + O_2$ (reversible; see 3).
(5) $C + CO_2 = 2CO$ (reversible; see 6).
(6) $2CO = C + CO_2$ (reversible; see 5).

Hauenschild's discussions concern reactions 5 and 6, the occurrence of one or the other depending on the position of balance between the reactions 5 and 6, and this again is determined by pressure and temperature. The relation of balance between C, CO and CO_2 at atmospheric pressure are as follows:

Deg. F.	% CO_2	% CO
932	95	5
1112	77	23
1292	42	58
1382	25	75
1472	7	93
1652	3.5	96.5
1832	0.7	99.3

According to Hauenschild, for example, at 1382 deg. F. only a maximum of 75% of CO_2 can react with C to CO and the other 25% must be discharged without being used, and even at 1652 deg. F. the balance is still 3.5% towards the side of CO_2. Action in this manner depends on the velocity of the reaction, which must be a sufficient velocity. The formation of CO from C and CO_2 belongs to the sluggish reactions, being slower with the harder and more solid fuels such as anthracite and coke, and yet Bertelsmann demands temperatures above 1832 deg. F. and at best between 2192 and 2372 deg. F., and a long period of contact or a heavy layer of fuel in the generator to attain the most complete conversion of CO_2 to CO. According to Hauenschild, there follows after the conversion between coal and CO_2 of the raw mix the burning of the CO formed to CO_2 according to formula No. 3 of the general reaction scheme, which has a high reaction velocity and though reversible does not reverse due to the balance being entirely on the side of CO_2. According to Kuehl, a direct oxidation of the coal takes place which is irreversible, the balance being entirely on the side of CO_2; and the combustion of the coal with oxygen is very rapid, at 1562 deg. F., being 700,000 times that of the reaction between C and CO_2. He concludes that a direct reaction between C and CO_2 does not even appear at all. Further discussion deals with direct questions by Hauenschild.—*Zement* (1928), **17**, 49.

A. Hauenschild in rejecting Kuehl's "theoretical explanation" of the burning process shows that the equilibrium of the reaction $CO_2 + C = 2CO$ is entirely on the side of the carbon monoxide. Kuehl traces the burning process exclusively to a direct oxidation of the carbon and attributes but an incidental importance to the gasification; whereas Hauenschild attributes the principal role to gasification.—*Zement* (1929), **18**, 3.

Synthetic Gypsum. Lime is dissolved in an excess of water, the solution kept heated and a hot sulphuric acid solution added; without much agitation, the excess of water is trapped in *statu nascendi*, resulting in a fine grained insulation mass of 0.35 sp. gr. or less. The porous, spongy intermediate product sets in a few minutes and is sufficiently hard to remove from forms for further drying.—*German Patent No.* 461,889.

Colored Portland Cement. To the raw cement mix is added colored metallic compounds and chemicals such as chromium oxide, nickel oxide, cobalt oxide, copper oxide, also such substances as phosphate, borate or metal halogen compounds. When these substances are heated along with the coloring metal compounds they result in colored fusions and not merely in a mechanical mixture. For example, a raw cement mix is mixed with fluorspar, borax and chromium oxide and this mixture is prepared into a cement. Before sintering, a reducing agent such as coke may be added to the raw mix, if desirable. The above yields a purely green cement.—*German Patent No.* 476,849.

Hydraulic Limes and Gypsum from Lignite Ash. According to H. Luftschitz, it is possible to produce hydraulic limes and gypsum from the ash residues of lignite or brown coal. The ashes are calcined at about 2300 deg. F. and ground in a ball mill to leave a 15-18% residue on the 175-mesh screen. One of the samples so treated gave a product analyzing 44.5% CaO and 29.44% SO_3; mixed with sand (1:3) and specimens stored in air for 28 days, then broken in the usual way showed strength of 3700- and 4380-lb./in.^{2}.

Coal ashes high in silica produced a good hydraulic lime with all the usual properties. If to the boiler ash, just as it comes from the boilers, limestone is added and the whole ground and calcined, there results a good hydraulic lime also. Much of the SO_3 in these ashes is converted if the calcining takes place in an excess of air.—*Tonindustrie-Zeitung* (1929), **53**, 4.

There are enormous resources in lignite and peat in the United States and Canada which will be required increasingly for operating the power plants. If the resulting ashes are to be used in making special limes, such plant could suitably be located at the lignite or peat resource, to which the cars returning from the power plant to haul more fuel could deliver the ashes for utilization. —The Editors.

Portland Cement Moduli. The hydraulic modulus of portland cement is of prime importance in correcting the raw mix or in the graphic representation of the four-component system, according to Hess. All regularities which could possibly be found with the four-component system: CaO, SiO_2, Al_2O_3 and Fe_2O_3, which was used as a basis, were obtained, divided into six groups according to the different constant and non-constant relations, and investigated by graphic representation on the tetrahedron, each case having been obtained mathematically from a portland cement with a hydraulic modulus of 2.00, and a graphic representation prepared for each. Thereby the extremes of each individual case take on compositions which are no longer portland cements, but each regularity in the graphic representation must pass through the portland cement point from which the start was made; this operating method has the advantage that the position of a plane or a line can be determined more accurately and wholly.—*Zement* (1929), **18**, 2.

Manganese in Cement Clinker. In portland cement clinker of normal composition, manganese occurs in the form of oxide. It can replace the iron oxide to a certain extent, so that by an increase a early high-strength cement may be obtained just as if iron oxide were used to accomplish this result. In high-limed clinkers, the manganese is contained in the heavy, colored constituent known as Celit. Manganese oxide contents in excess of 3% raise the burning temperature.—*Zement* (1929), **18;** 16, 17 and 18.

Porous Concrete. To the dry materials as, for example, the mixture of cement and sand of the customary proportions of 1:4 to 1:7, is added from 0.1 to 0.5% metallic calcium. Water is then added to obtain the consistency of a mortar just pourable, and the forms are then filled to 70 to 80% of their capacity. If the gas-producing agent, metallic calcium, is of rapid action, from 30 to 45 minutes is required and if it is of slow action, from 3 to 4 hours is required for the mortar to expand until it fills the form. The mortar may be poured direct into the construction forms of buildings, but not to a greater depth than 40 cm. (16 in.) at a time. In order to vary the rapidity of expanding action of the metallic calcium, the calcium is alloyed with certain other substances.—*Die Chemische Fabrik* (1928), **29**, 30.

Graphic Representation of Four-Component System in Raw Cement Mixing. The method proposed by Philipsborn uses for a model a spatial tetrahedron, bordered by four equilateral triangles; this is the starting point of the projection method. By the special selection of two projection points also for the presentation of points, which are located inside the tetrahedron, clarity is attained; in all operations the worker can be guided by spatial conception. The author admits that the relations between chemical composition and the relations of the cements in the Spindel parallelogram are easier to survey and easier to handle graphically than by his method. But his method presents a comparatively simple solution to the problem, to project the tetrahedron with its presenting points located inside it, in spatial clearness and in such a way that graphic operations are possible—a problem for which also Kuehl, Spindel and Nitzsche have solutions. The retention of the tetrahedron has certain advantages as compared to a specialized method, all calculations remaining within the simple geometrics of the tetrahedron.—*Tonindustrie-Zeitung* (1929), **53**, 3.

Utilization of Dolomite. A Krieger describes the uses, properties, composition, burning and chemical relations of the dolomites.—*Tonindustrie-Zeitung* (1929), **53**. 20.

Effects of Trass Admixture on Gypsum Properties. A. Steopoe found that additions of trass affected the set and tensile strength of gypsum in a manner similar to its influence on the properties of portland cement mortar. The pouring and working period of the gypsum is prolonged by the addition of trass. The tensile strength increases up to a certain percentage of trass addition, but decreases rapidly when more trass is added; this effect shows up distinctly in the 7-day test specimen and not so much in the 1-day test specimen.—*Tonindustrie-Zeitung* (1929), **53**. 52.

The Formation of Two Different Calcium-Sulfo-Aluminates from the Gypsum in Cement. P. Mecke, employing a portland cement and two slag cements, determined the solubility of the sulphur combinations before and after the set in hot and cold water and the solubility of mixtures of gypsum and cement after the set in cold water. He compared the results of these tests, presenting synthetic representations of various sulfo-aluminates, the whole including microscopic, microchemical and optical testing. The action of hydrate of lime and aluminate upon the sulfo-aluminate $(CaO)_3 \cdot Al_2O_3 \cdot 3CaSO_4$ produces a salt of the composition $3(CaO) \cdot Al_2O_3 \cdot 2CaSO_4$. This formation of one salt from the other may be expressed by the following formula:

$$2[(CaO)_3 \cdot Al_2O_3 \cdot 3CaSO_4] + (CaO)_3 \cdot Al_2O_3 = 3[(CaO)_3 \cdot Al_2O_3 \cdot 2CaSO_4]$$

Both sulfo-aluminates are differentiated, outside of their molecular composition; by their different crystal shapes; by the optical behavior of the crystals, and by the fact that in the formation of the second salt the sulphuric acid precipitates almost entirely, even from very much diluted solutions, whereas in the formation of the salt according to Michaelis about 40% of the sulphuric acid still remains in the solution after 24 hours. When during the set of the cement a greater quantity of hydrate of lime, or lime aluminate, arises than is necessary for the formation of the Michaelis salt $[3(CaO) \cdot Al_2O_3 \cdot 3CaSO_4]$ from the gypsum, then the excess must act chemically upon this. It can therefore be assumed that the so-called cement bacillus consists of the more stable calcium-sulfo - aluminate $(CaO)_3 \cdot Al_2O_3 \cdot 2CaSO_4$.—*Tonindustrie-Zeitung* (1929), **53**, 38.

Volmetric Determination of Lime in Cements. The pulverized sample is dried at 221 to 230 deg. F., after which ½ gram is dissolved in 20 cu. cm. of normal hydrochloric acid, as follows: the cement is first brought into a dry Ehrlenmeyer flask and 10 cc. of hydrochloric acid is slowly added from the burette. After a few vigorous shakings all particles of cement are rinsed to the bottom of the flask by the second 10 cu. cm. of hydrochloric acid, the whole heated to a slow simmer (not boiling). The sides of the flask are then washed with as little water as possible and heating carefully continued until all is dissolved that can be in hydrochloric acid. The hot solution is titrated back with half-normal NaOH, bromthymol blue, in saturated hydrous solution being used as indicator. Titration is complete when the solution shows a deep dark-blue color.

This method gives the lime content of a cement, sufficiently accurate, within 15 to 20 minutes.—*Tonindustrie-Zeitung* (1929), **53**, 6, p. 105-106.

Composition and Properties of Natural Cements. Dr. Haegermann has tested samples of so-called natural cements which were obtained on the market and which originated from 10 different plants. According to the 20 tables of test data, the so-called natural cement must be classed as a binding agent located between hydraulic-lime and ordinary standard cement.—*Zement* (1929), **18**, 28, and *Tonindustrie-Zeitung* (1929), **53**. 55.

Gypsum Manufacture at Triel. J. Prouteau describes the deposits and manufacturing operations at the three plants of A. Bourdet et Cie, with details of the wood-fired "abutment" kiln at the Chanteloup plant.—*Rev. des Mater. de Constr.* (1929), 236.

Increasing Reactivity of Slags. The mechanical admixing of gypsum to cement of blast furnace slag influences only the strength. In the new process gypsum or other sulphur bearing active substances are added to the molten slag and brought under a reducing heat to a reaction in such a manner that the detrimental MnO present in the slag is partly or entirely converted into MnS. After completion of this reaction the CaO content is increased by addition of CaO, also under reducing reaction. The otherwise inert slag is thereby converted into reactive rapid setting slag and the mechanical strength is also improved.—*German Patent No.* 467,829.

Action of Aggressive Solutions on Cements and Concretes. Probst and Dorsch investigated the effects produced in different cements and cement mixtures by the action of aggressive chemical solutions such as a 15% sodium sulphate solution, 15% ammonium sulphate solution, saturated calcium sulphate solution, 15% magnesium chloride solution, 15% sugar solution. The data obtained showed that the alumina cement is the most stable against aggression of sulphate-bearing solutions, showing only 6.67% SO_3 after four months storage in ammonium sulphate, the order of stability being high grade portland cement, ordinary portland cement, blast furnace cement, portland "jurament," alumina cement. The cements prepared with Rhine sand were, due to the greater compactness, more stable to sulphate than the standard sand-made specimens. The tests confirmed again that cements lean in lime are more stable to sulphates. After 360 days' storage in saturated calcium sulphate solution, 15% magnesium chlorate solution or 15% sugar solution, no traces of disintegration were observed in any cement except the high grade portland cement which showed disintegration after 305 days in saturated calcium sulphate solution.—*Zement* (1929), **18**, 10, 11.

Early High-Strength Cements. A. Hasch distinguishes two groups of such cements, namely, the "high grade" or early high-strength portland cements and the alumina or fused cements. In the early high-strength portland cements the lime content of the raw mix must naturally be greater than in the portland cements. Furthermore, the hydraulic factors (silicic acid, alumina and ferric oxide) must on occasion be adjusted to each other by suitable additions such as bauxite, ore grate dust, kaolin, slags fat in alumina, etc., the mix prepared especially carefully, the clinker burned more and ground finer. Additions of chemicals can give a greater resistance of the cement to acids, lyes, salt solutions, sea water, etc. By adding soda, alumina or calcium chloride it has been tried to change an ordinary portland cement into an early high-strength cement; a quicker setting is actually obtained, but along with this also lower final strengths and a danger of swelling later on.

The manufacturing process of the second group of these cements differs from the first group in that the raw mix is burned not to sintering but to a fusing point either in the electric or in the forced draft kiln. Furthermore, it differs from the portland cements by its high alumina content of 35 to 50% and by lower lime and silicic acid content.

Though the Frenchman Jules Bied is considered as the inventor, this field had been touched with important research by Winkler, Berthier, Michaelis, Passow, Fremy and Schott. The bauxite byproduct in aluminum production was used first in France to make this fused cement for gun foundation work in the World War. Manufacture then started also in Austria and Sweden by utilizing the power from hydro-electric plants to save coal; the Swedish engineer Wennerstroem passed hot liquid blast furnace slag into a graphite tank and produced by placing pieces of lime upon this batch of slag an electrically burned cement by using a carbon rod dipped into it as the second electrode, this process requiring 1.5 kw. hr. of electricity per 1 kg. (2.2 lb.) of cement produced. The setting of the alumina cement starts after 2 to 3 hours and is terminated after 5 hours. Hardening takes place very rapidly and already after 24 to 48 hours the strength is greater than that of the best portland cement after 28 days. Very generally the compressive strength of the 1:3 mortar when using fused cement is after 24 hours four times that of the ordinary portland cement, the tensile strength double after 3 to 4 days. The average chemical composition of the alumina cement as compared to portland cement and "high grade" portland cement is as follows:

Cement	Analysis SiO_2	Analysis CaO	Analysis $Al_2O_3 + Fe_2O_3$	Hydraulic Modulus $\frac{CaO}{SiO_2 + Al_2O_3 + Fe_2O_3}$
Ordinary portland	21	63	7.6 + 2.7	1.8
"High grade" portland	21	68	8 + 3	2.0
Electric fused alumina	10	37	53	0.5

From the standpoint of construction, the high grade special portland cement has not been beaten by the fused cement in respect to hardening and strength, but the great preference of fused cement is due essentially to its ability of resistance to chemical aggression. In constructing a railway tunnel in 1926, the resistance to sulphate water was so complete that the local anhydrite ($CaSO_4$) could even be used as aggregate for the concrete without endangering the structure. Bauxite is the most important raw material for alumina cement and in its purest state is a hydrogel with 65.34% Al_2O_3 and 34.57% H_2O, but as a rule is more or less contaminated by iron hydrogel, silicic acid, etc. The deposits are rather scarce, France having the largest of 60,000,000,000 tons. In Germany attempts have been made to supplement the unsuitable local bauxite with chemicals and produce the cement in forced air kilns instead of in electric kilns.—*Tonindustrie-Zeitung* (1929), **53,** 8.

Fused Alumina Cement. The necessary quantity of those substances which dissolve or bind sufficient silicic acid is to be added to clay high in silica in order to decrease the content in silicic acid to that admissible for alumina fused cement; employing for this an addition of fluoric acid or of fluorspar and sulphuric acid or metals or metal compounds forming metal silicide and a reducing agent. Not only is high-silica clay to be used, but also other materials containing alumina (alumina silicate) as, for example, clay marl, kaolin, slag, coal ash, etc. To these substances may then be added not only the above named agents for dissolving and binding silicic acid, but also fluorspar and alumina (argillaceous earth). in the latter case the fluorine or the fluoric acid being formed and expelled from the fluorspar in the fusing of the alumina, combines with a part of the silicic acid present into fluosilicate compounds and is fixed in this manner. If necessary, lime in the form of caustic lime, limestone, lime marl, fluorspar, etc., may be added.—*German Patent No.* 467,408.

Effect of Admixtures on Concrete. Based on extensive research and laboratory investigation, Otto Graf concludes that (1) calcium chloride increases the shrinking and expanding of cement mortar considerably; (2) trass retards the aggression of magnesia sulphate and magnesia chloride upon mortar; (3) with the same addition of cement, pulverized sands yield more permeable mortars than those having additions of moraine and river sand; (4) abrasion of the mortar increases with an increase in the proportion of fine sand; (5) the influence of the addition of water upon the extent of abrasion is greater in lean mortars than in rich mortars; (6) shrinkage and expanding of the mortars is less among the coarser mortars.—*Zement,* **17;** 40, **41;** 42, 45, 46, 47.

Italian Reinforced Concrete Pipe. G. Prudon describes the centrifugal process of the Societe Cepeca (Italy) for manufacturing reinforced cement pipes and posts in *Science et Industrie* (1929), 180, p. 60-62.

Determination of the Specific Weight of Cements. A Ferrini states that the Le Chatelier and Schumann volumeters for determining the specific gravity of cements have certain disadvantages which lead to doubtful results. The filling of the cement through the narrow tube and the removal of the confined air present difficulties which to a certain extent are eliminated in a new design of the Schumann apparatus. These changes are in the main vessel, which is now a conical affair; the shape of the measuring tube remains unchanged, but at its upper end an enlarged stoppered cylindrical neck with a capacity about that of the setting vessel has been provided.

To operate, the device is charged with benzine to the zero mark, the apparatus turned while holding the stopper, so that the benzine flows into the upper wide neck; then the setting vessel is removed, 50 grams of cement applied through a wide neck ground funnel and contact re-established carefully with the measuring cylinder. Any air bubbles possibly present are removed by a slight rapping against the apparatus, which is now again in vertical position. The reading may be taken after it has stood for a short time. —*Le Industrie del Cemento* (1929), **26,** 4.

Recent Progress in Cement. The improved Dyckerhoff and Co. method of agitating cement slurry by compressed air is discussed and illustrated in *Zement* (1928), **18, 3.** A special compensation tank has been added for this process by which the contents of the slurry silos are regulated. P. Budnikoff and W. M. Leschoeff, collaborating, in a recent investigation (*Zement,* **17,** 42) found that the maximum content of SO_3 in portland cement cannot be definitely fixed. According to the research, destruction rate of concrete depends chiefly on the Al_2O_3 contents, concentration of the sulphate, porosity, differences in hydrostatic pressure, etc. The investigators state that mechanical strengths of concrete are influenced by the quantity of calcium sulphate and portland cement as well as hydration of any dead-burned gypsum and recrystallization of gypsum dehydrate which is introduced into the portland cement.

A new single-compartment tube mill for grinding coal only 10 ft. long and 40 in. in dia. for which high efficiencies are claimed is described in the *Tonindustrie-Zeitung,* **53,** 19. Hess (*Zement,* **18,** 8) gives examples of the prevailing graphic methods of determining the raw material mixes for portland cements. K. Biehl, in a recent review of investigation (*Tonindustrie-Zeitung,* **53,** 19) on the strengths of concrete made with early-high strength cements, is of the opinion that the tensile strengths obtained under different conditions, viz., 28-day combined storage and those gained on the steam-cured specimen, do not agree to any extent. He attributes the lower strengths of the steam-cured specimens to be due to leaching out of lime hydrate under those conditions.

N. C. Kyriacou describes the Chalkis, Greece, cement mill, especially designed for the production of high-early strength cement (*Rev. de Mat. de Con.,* **228, 230, 231, 232).** The author gives some of the technical difficulties of production of this type of cement, and waste heat recovery system, pulverizers, etc., goes into the details of the kiln design and installation. (See also Rock Products, September 28, 1928, p. 84.)

Proportions of the grain sizes of pulverized cement particles have been determined in a new series of experiments at a Swedish institution. The investigators found that the hydration of different sized particles was a function of time and the compressive strengths of portland cement concrete depended greatly on the proportions of different sized cement particles, the finer sized particles being a chief contributing factor. (*Zement,* **17, 27, 28.**) A special study of

the properties of hydraulic cements made from blast furnace slags is reported in *Rev. de Mat. de Constr.*, **226,** p. 250.

The new Foerdereuther screening apparatus for test determinations of finished portland cement is described and illustrated in the *Tonindustrie-Zeitung,* **52,** 89. The new machine is primarily designed to give the finer screens a greater intensity of motion, thereby cutting down the screening time and thus obtaining greater accuracy. Some of the usual difficulties and inaccuracies encountered in test screening are discussed in this article.

One of the researches undertaken at the German Technical Institute, Berlin, deals with the influence of the chemical composition and fineness in grinding upon the water requirement of cements for cement mortars. A rule for the interrelation between chemical composition, water addition and strength could not be found, but it was shown that the finest ground cement does not always give the greatest strengths and that somewhat coarser granulated cements are less damaged by greater additions of water than very finely ground cements. After mentioning a number of researches, the results of which are to be published in periodicals, H. Kuehl, director, states that he is preparing a book dealing with the literature in the cement industry, including selections of raw material. A critical compilation, a book on the chemistry of hydraulic binding agents, has already been published by him and Knothe (1916), but is now deemed out of date.—*Zement* (1929), **18,** 13.

Description of the D'Espiet cement plant erected near Bordeaux, France, for the annual output of 50,000 tons of cement by the wet process.—*Rev. des Mater. de Constr.* (1928), 231.

K. Tremmel (*Zement,* **18,** 17) concludes from three tests with raw mixes burned in a coke-fired automatic shaft kiln that the fuel is submitted considerably to the action of the carbonic acid gas from the limestone. A complete gasification according to stoichiometrically calculable quantities does, however, not take place and considerable quantities of fuel must be burned direct by the atmospheric oxygen. Further, if the fuel is not ground with the raw material, but is pressed in in granular condition, the CO formation will be less corresponding to the smaller contact surface between fuel and carbonic acid and that instead, due to the porosity of the fuel developing in the burning, the direct burning by the blower air or forced air is correspondingly facilitated.

Sanding of Alumina Cement Concretes. Lund states that theoretically possible inclination to "sand off" or of other disturbances in setting of alumina cement may be expected after a loss of 11% of the water occurs, whereas portland cement can withstand a water loss of even 38%.—*Zement* (1929), **18,** 23, 24.

Recent Process Patents

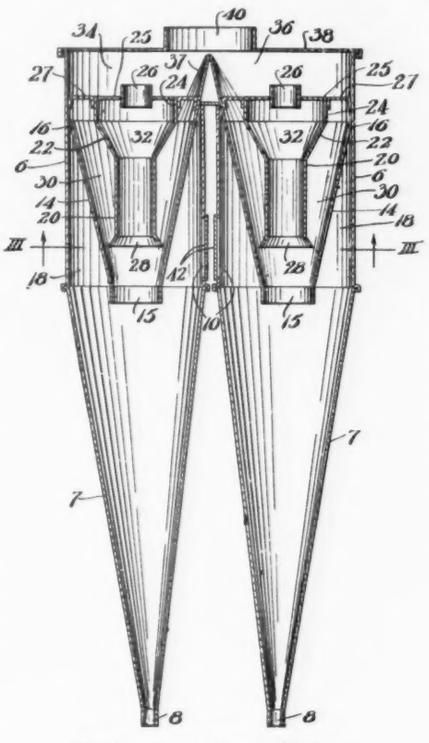
The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Improved Portland Cement—A cement composition according to the present invention may be composed by mixing with each 100 parts by weight of portland cement less than 20 parts by weight of lime, 5 parts of plaster of paris and 125 parts by weight of extenders, such as silica sand, quartz, granite, macadam or others. These materials are preferably so finely ground that the portland cement will react quantitatively with added water, that the silica in the extender will react with the lime and that the lime is completely slaked before the binding of the cement takes place.

A satisfactory product has been obtained by mixing and finely grinding 50 parts by weight of sand, 40 parts portland cement, 2 parts of gypsum and 8 parts of burnt lime.

By this method the strength of the cement is claimed to be increased 19, 20 and 30% or more without involving elimination of the volume constancy.—*L. Forsen,* U. S. Patent No. 1,712,818.

Dust Collection. A dust collector which employs a somewhat different system from that of the ordinary cyclone has a cylindrical upper portion fitted with conical and cylindrical partitions. The dust laden air is brought in at the lower part of the cylinder through the usual tangential inlet which creates a whirling current in the cylinder. The air then passes around the partitions which are arranged to act as dust traps, as they form dead spaces from which the dust slides down into the lower conical portion. The dust free air goes through a relatively small opening above the last partition into a chamber which communicates with the stack or outlet.



Duplex type dust collector

The apparatus is shown in duplicate but the reason for this is not stated in the claims beyond stating that such a duplex form has a common inlet and a common outlet.—*C. Jensen.* April 9, 1929. U. S. Patent No. 1,708,697.

Cutting Plaster Board—A cutting device of plaster board and the like comprises a pair of knives movable toward each other at opposite faces of the board. Each of these knives has been provided with pointed teeth adapted to perforate the faces of the board and then to enlarge the perforations by the action of the obliquely disposed cutting edges of the pointed teeth until the several perforations are completely united at the bases of the teeth. The points of the teeth entering either of the faces of the board remain in substantial spaced relation with respect to the other face of the board after the complete severance of the face portions.—*J. J. Turner, assignor to Universal Gypsum and Lime Co.,* U. S. No. 1,716,991.

Process for Preparing Fertilizers—The authors of this patent propose to convert the more or less insoluble natural phosphates to a soluble form by mixing with the phosphorites about one molecule of an alkali metal oxide in the form of its salt and at least one molecule of silica for every molecule of P_2O_5 present. They further specify that for every molecule of silica present there should be additional lime supplied so that calcium orthosilicate may be formed, it being recalled that in the event an alkali calcium phosphate is used that salt will supply some of the necessary lime for the formation of the calcium orthosilicate.

When this properly proportioned mixture has been prepared, they subject the mix to a temperature of 900 deg. C. in the presence of steam. A working example follows: 100 parts of raw phosphate with 39.7% P_2O_5, 47% CaO bound in phosphoric acid, 5.61% CaO not bound in phosphoric acid, and 0.56% SiO_2 were mixed with 55 parts of potassium sulphate with a content of 48% K_2O, 15.5 parts quartz and 20 parts limestone. The mixture was "glowed" or heated at a temperature of about 1000 deg. C., steam being passed over it. The heated product contained 27.46% total phosphoric acid and 26.61% citrate-soluble phosphoric acid.—U. S. Patent No. 1,704,218.

Sorel Cement Product. A mixture of aggregate with binder of Sorel cement type in which is incorporated an emulsion containing a water resistant stable constituent of a character which does not materially affect the chemical reaction between the magnesium oxide and the magnesium chloride, and cracking the emulsion in the Sorel cement mixture by means of a cracking agent.—U. S. Patent No. 1,724,945.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Aug. 24	Aug. 31	Aug. 24	Aug. 31
Eastern	4,344	4,324	18,299	19,769
Allegheny	4,560	4,741	11,301	11,603
Pocahontas	411	404	1,677	1,438
Southern	669	637	11,107	11,168
Northwestern	1,509	1,635	11,283	11,046
Central Western	568	524	15,851	16,863
Southwestern	693	643	8,750	9,161
Total	12,754	12,908	78,268	81,048

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1928 AND 1929

	Limestone Flux 1928 Period to date	1929	Sand, Stone and Gravel 1928 Period to date	1929
District	Sept. 1 Aug. 31		Sept. 1	Aug. 31
Eastern	99,664	115,348	345,983	358,723
Allegheny	114,904	123,029	240,632	233,061
Pocahontas	16,022	13,178	27,676	31,912
Southern	19,683	18,439	365,159	306,571
Northwestern	46,207	37,540	218,287	205,241
Central Western	14,749	17,958	351,806	353,869
Southwestern	14,216	16,518	209,878	223,240
Total	325,445	342,010	1,759,421	1,712,617

COMPARATIVE TOTAL LOADINGS, 1928 AND 1929

	1928	1929
Limestone flux	*325,445*	*342,010*
Sand, stone, gravel	*1,759,421*	*1,712,617*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning September 21:

SOUTHERN FREIGHT ASSOCIATION DOCKET

47032. **Stone, crushed,** etc., from Whitestone, Ga., and Tate, Ga., to New Durham, N. J. Class or combination rates now apply. Proposed rates on stone, crushed, ground or pulverized, carloads, minimum weight, 40,000 lb., from and to above named points: In bags, 724c; in bulk, 677c per net ton. Same as rates to Fairview, N. J.

47097. **Glass sand,** from Goshen, Va., to Laurens, S. C. Present rate, 680c per net ton. Proposed rate on glass sand, carloads (See Note 3), from Goshen, Va., to Laurens, S. C., 230c per net ton.

47118. **Molding sand,** from Evansville, Ind., to Thomasville, Ga. Present rate, 383c per net ton. Proposed rate on **molding sand,** carload, as described in Agent Speiden's I. C. C. 1202, under Item 7290, from Evansville, Ind., to Thomasville, Ga., 300c per net ton.

47148. **Sand,** from N. S. R. R. shipping points to Charlotte, Raleigh, Durham and Greensboro, N. C. It is proposed to establish the following reduced rates on sand, carloads, subject to minimum weight 100,000 lb. (when 90% of marked capacity is less than 100,000 lb., such 90% of marked capacity will apply as minimum), except when cars are loaded to their visible capacity, the actual weight will govern. In cents per net ton. From Tailbird, N. C.; West End, N. C.; Harmon, N. C.; Candor, N. C.; Ellis, N. C.:

To—		To—	
Charlotte, N. C.	80	Durham, N. C.	80
Raleigh, N. C.	80	Greensboro, N. C.	100

47213. **Stone,** from Blair, S. C., to northern and western points. Lowest combination now applies. It is proposed to establish rates on stone, as indicated in Description Nos. 51 and 52 of Southern Ry. Stone Tariff, I. C. C. A9979, from Blair, S. C., to northern and western points published on pages 74 to 85, incl., same as published from Columbia and Rockton, S. C.

SOUTHWESTERN FREIGHT BUREAU DOCKET

18384. **Limestone,** between points in the southeast and points in Arkansas, Missouri, etc. It is proposed to amend the descriptions covering all rates on phosphate rock applying between points in the southeast and points in Arkansas, Kansas, Missouri, etc., to specifically indicate that such descriptions include phosphatic limestone. For example, the description applying generally in connection with rates published in L. & N. R. R. Tariff G. F. O. 44C are to be amended to read: "Phosphate rock, crude lump or phosphate rock, crude ground (including phosphatic limestone), in bulk or in bags, carloads." There is no question as to the propriety of the application of phosphate rock rates on phosphatic limestone. It is merely for commercial reasons that the shippers are urging the use of the term "phosphate limestone," it being their desire to be able to describe this article in the bills of lading as phosphatic limestone because of a strong prejudice among the feed manufacturers to the use of the term "phosphate rock."

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

18385. **Silica,** from Rogers, Ark., to Tulsa, Okla. To establish a rate of 16c per 100 lb. on silica (silex), carloads, minimum weight 50,000 lb., from Rogers, Ark., to Tulsa, Okla. The proposed rate represents 15% of 13535 first class. This basis has been approved by southwestern carriers on Tripoli, and shipper feels he should be accorded the same basis.

18464. **Sand,** from points in Missouri to points in Indiana. To establish a rate of $3.20 per ton of 2000 lb. on chatt sand, carloads, minimum weight 100,000 lb., from:

Alba, Mo.
Atlas, Mo.
Aurora, Mo.
Carthage, Mo., to Adams, Ind.
(Monroe county)
Bedford, Ind.
Bloomington, Ind.
Clear Creek, Ind.
(Monroe county)
Granby, Mo.
Joplin, Mo.
Neck City, Mo.
Oronogo, Mo.
Coxton, Ind.
Dark Hollow, Ind.
Diamond, Ind.
Dodgson, Ind.
Ellettsville, Ind.
Harrodsburg, Ind.
Porto Rico, Mo.
Purcell, Mo.
Webb City-Carterville, Mo.
Hunters, Ind.
(Monroe county)
Ketchums, Ind.
Murdock, Ind.
National, Ind.
Oolitic, Ind.
Peerless, Ind.
Putnamville, Ind.
Quarry Junction, Ind.
Reeds, Ind.
Sanders, Ind.
Smithville, Ind.
Stinesville, Ind.
Victor, Ind.

The above rate, it is stated, is 8½% of the first class rate (southwestern scale) for distance of 562.7 miles, this being the mileage from Joplin, Mo., to Bedford, Ind., and which shipper states is necessary in order to move the traffic.

TEXAS-LOUISIANA TARIFF BUREAU DOCKET

139-TX (Sub. 7568-TX). **Limestone, agricultural,** privilege of unloading in transit between stations on C. R. I. & G. R. R.: Proposition from carriers to establish privilege of unloading in transit carload shipments of agricultural limestone between stations in Texas on C. R. I. & G. R. R. waybilled in regular manner from point of origin to next station beyond the unloading point at tariff rate plus $6.30 per car, minimum charge of $63 when handled by special train. Shippers have option of paying $63 for 10 cars or less or having less than 10 cars distributed by local train at rate of $6.30 per car.

WESTERN TRUNK LINE DOCKET

6962-B. **Limestone, agricultural,** in bags, barrels, etc., from Dubuque, Ia., to various stations in Wisconsin. Docket No. 6962-B, listed in Docket Bulletin No. 2489, August 24, has been withdrawn.

ILLINOIS FREIGHT ASSOCIATION DOCKET

I. R. C. 5223. **Crushed stone,** carloads (See Note 1), from Stolle, Ill., to Prairie du Rocher, Ill. Present, class; proposed, 90c per net ton.

CENTRAL FREIGHT ASSOCIATION DOCKET

22697. To establish on **crushed stone and crushed stone screenings,** etc., Bluffton, O., to Deerfield and Saratoga, Ind., rate of 110c net ton. Present—Sixth class, 14½c. Route—Via N. Y. C. & St. L. R. R.-Red Key, Ind., P. R. R.

22699. To establish on **sand and gravel,** carloads, Cleves, O., to Yellow Bank, Ind., rate of 75c and to Metamora, Ind., rate of 80c net ton. Present—85c to Yellow Bank, Ind., and 85c to Metamora, Ind.

22701. To establish on **crushed stone and crushed stone screenings,** carloads, Findlay, O., to Sycamore, O., rate of 70c net ton. Present—Rate of 90c net ton.

22707. To establish on **sand** (other than blast, engine, foundry, glass, loam or building), carloads, from Butler, Penn., to Cleveland, O., proposed, open top cars, 110c; box cars, 127c. Present, open top cars and box cars, †*17c.

†Sixth class rate in cents per 100 lb.

*Rate published by B. & L. E. R. R. in Tariff I. C. C. 904 is 120c per 2000 lb., in open top cars or in box cars.

22711. To establish on **crushed stone,** carloads, from Ingalls, Ind., to Indiana points, in cents per net ton:

To—			To—	
C.C.C. & St. L. Ry. (Mich. Div.)	Pro.	Pres.	C.C.C. & St. L. Ry. (Mich. Div.)	Pro. Pres.
N. Manchester	90	101	Anderson	60 69
Speicher	85	100	Emporia	60 70
Treaty	80	95	Shirley	65 75
Marion	75	80	Carthage	70 88
Jonesboro	70	80	Henderson	75 88
Summitville	65	80	Rushville	80 88
Linwood	60	70		
C.C.C. & St. L. Ry. (Indianapolis Div.)			C.C.C. & St. L. Ry. (Indianapolis Div.)	
Brightwood	60	70	Farmland	75 82
Daleville	60	70	Harrisville	80 95
Muncie	65	72	Union City	85 100
Parker City	70	82		
Central Indiana Ry.			Central Indiana Ry.	
Bloomer	70	75	Eagletown	85 ....
Durbin	75	92	Jolietville	85 ....
Noblesville	80	97	Rosston	85 ....
Westfield	80	97	Gadsden	85 ....

22712. To establish on **sand,** except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica, and **gravel,** carloads, Kenneth, Ind., to Chalmers, Ind., C. I. & L. Ry. Delivery, rate of 75c net ton. Present—101c net ton.

22715. To establish on **crushed stone,** carloads, Melvin and Thrifton, O., to North Vernon, Ind., rate of 135c net ton. Present—161c net ton.

22716. To establish on **refuse limestone screenings,** carloads, Kaylor, Penn., to Universal, Penn., rate of 80c net ton. Present—14c (sixth class).

22718. To establish on **sand and gravel,** carloads, Peru, Ind., to Goldsmith, Ind., via N. Y. C. & St. L. R. R. direct, rate of 80c net ton. Present—Sixth class.

22724. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry glass, grinding or polishing, loam, molding or silica), and **gravel,** carloads, Hugo, O., to Oberlin, O., rate of 90c net ton. Present—100c net ton.

22730. To establish on **lake or beach sand,** carloads, Bridgman and Sawyer, Mich., to Ft. Wayne, Ind., rate of 126c net ton. Present—151c net ton.

22739. To establish on **stone, fire and ganister** (See Note 1), Coal Grove, O., to Jackson, O., rate of 100c net ton. Present—13½c (sixth class). Route—Via Sciotville, O., and B. & O. R. R., also via Ironton, O., and the D. T. & I. Ry.

22740. To establish on **molding sand,** carloads, McCool, Ind., to Chicago, Ill., B. & O. R. R. deliveries (single line), rate of 75c net ton. Present—Sixth class, 12c.

22748. To establish on **crushed stone,** carloads, McVittys, O., to Arlington, O., rate of 70c net ton. Present—Sixth class.

22749. To establish on **crushed stone,** carloads, McVittys, O., to Luckey, O., 85c, and to Dowling, O., 90c net ton, via C. C. C. & St. L. Ry. and N. Y. C. R. R. (west and O. C. L.). Present—Sixth class.

22750. To establish on **crushed stone,** carloads, Greencastle, Ind., to Peru, Ind., rate of 115c net ton. Present—Sixth class.

22752. To establish on **sand, lime,** carloads, Jackson and Saginaw, Mich., to points in Michigan shown in Exhibit "B" attached.

EXHIBIT "B"

Proposed rates on sand and lime, carloads:

To Mich. points. From Jackson	Prop.	Pres.	To Mich. points. From Jackson	Prop.	Pres.
Adrian	120	120	Kalamazoo	145	150
Albion	90	120	Lakeland	125	135
Ann Arbor	120	135	Lansing	120	125
Battle Creek	120	145	Manchester	105	120
Belleville	150	165	Milan	130	135
Charlotte	120	125	Monroe	150	150
Coldwater	135	150	Pontiac	150	150
Detroit	150	150	Schoolcraft	150	160
Dundee	130	135	South Lyon	125	140
Eaton Rapids	105	125	Sturgis	150	150
Fairfax	135	.....	Tecumseh	105	120
Findley	150	.....	Three Rivers	150	.....
Hillsdale	105	120	Wayne	135	165
Homer	105	.....	Wixom	135	140
Hudson	110	120	Wyandotte	150	150
Jonesville	105	120	Ypsilanti	120	135
From Saginaw			**From Saginaw**		
Alma	120	165	Midland	90	125
Annepere	135	200	Mt. Pleasant	135	175
Ashley	135	165	N. Lansing	135	155
Bath	135	.....	Otter Lake	105	165
Bay City	90	115	Owosso	120	145
Carson City	165	190	Oxford	135	180
Chesaning	105	.....	Paines	90	115
Chesterfield	180	200	Plymouth	165	180
Clifford	120	165	Pontiac	135	165
Detroit	170	200	Port Huron	165	180
Durand	120	145	Reese	90	125
Flint	105	115	Richmond	180	200
Holly	135	155	Rochester	150	180
Howell	135	180	St. Charles	90	.....
Imlay City	135	180	St. Clair	180	200
Laingsburg	135	.....	St. John's	150	190
Lansing	135	155	South Lyon	165	180
Lapeer	120	175	Vassar	90	125
Marine City	180	.....	Wixom	150	180
Marysville	180	200			

22767. To establish on **crushed stone,** in bulk, in open cars, and **crushed stone screenings,** in bulk, in open cars, Kenneth, Ind., to Polo Siding, Ind., via Winona R. R., rate of 92c net ton. Present—127c net ton.

22771. To establish on **crushed stone,** carloads, Thrifton, O., to Pomero, O., rate of 115c net ton. Present—*120c net ton.

*Rate from Piqua, O., applicable under intermediate rule.

22772. To establish on **stone dust,** carloads, Piqua, O., to Hicksville, O., rate of 127c and to Auburn, Ind., 175c net ton. Present—To Hicksville, O., rate of 17c, and to Auburn, Ind., rate of 196c net ton.

22810. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads, Elkhart, Ind., to Niles, Mich., via N. Y. C. R. R., South Bend, M. C. R. R., rate of 78c net ton. Present—Fifth class.

22813. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel,** carloads, County Spur, Mich., to Chesterton, Ind., rate of 117c net ton. Present—Classification basis.

22814. To establish on **sand, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads, Centerton and Campbells, Ind., to Aurora, Ind., B. & O. R. R. delivery, rate of 176c net ton. Present—Classification basis of 330c net ton.

TRUNK LINE ASSOCIATION DOCKET

21690. **Crushed stone,** carloads (See Note 2), from Steelton, Penn., to Brenford, Dover, Del., $1.50, and Hursley, Md., and Franklin City, Penn., $1.95 per net ton. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

21598, Sup. 1. **Limestone, unburnt, ground or pulverized,** carloads, minimum weight 50,000 lb., from Grove, Frederick, Security, Martinsburg, Winchester, Strasburg, Waverton district to Newark, O., 16c per 100 lb.

21709. To restrict application of rates on **sand, ground flint and ganister rock,** from Berkley Springs, Great Cacapon and Hancock, W. Va., Cumberland, Md., and Winchester, Va., published in Agent Curlett's I. C. C. A239, Item 5558C, to Kenova, W. Va., to apply via B. & O. direct or via B. & O.-Potomac Yard, Va.-C. & O. Ry. only. Present rates apply also via B. & O.-Chillicothe, O.-N. & W. Ry. Reason—There is no movement of these commodities via B. & O., Chillicothe and N. & W. Ry. Establishment of proposed restrictions will relieve the existing Fourth Section departures.

21711. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel,** carloads (See Note 2), from Georgetown, Chillum, Terra Cotta, D. C., and Bladensburg, Md., to Fischer, Md., $1.20 per net ton. (Present rate $1.40 per net ton.) Reason—Proposed rate is comparable with rates from Georgetown to Bell, Annapolis and Baltimore, Md.

21722. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2).

To—	From Morrisville, Penn. Prop. Rate	Pres. Rate
Gloucester, N. J.	81	80
Westville, N. J.	81	80
Woodbury, N. J.	92	90
Swedesboro, N. J.	92	90
Woodstown, N. J.	92	90

The above rates in cents per 2000 lb. Reason—Proposed rates are comparable with rates now in force from Menantico, N. J.

21723. **Crushed stone,** carloads (See Note 2).

To—	From Beavertown, Penn. Prop. Rate	Pres. Rate
South Danville, Penn.	85	†100
East Bloomsburg, Penn.	95	†115
Ralston, Penn.	130	* 22½
Marsh Hill Junction, Penn.	130	* 21½
Bodine, Penn.	130	* 21½
Trout Run, Penn.	130	* 21½

Proposed rates in cents per 2000 lb.
†In cents per 2000 lb. (commodity).
*In cents per 100 lb. (sixth class).

Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

21731. To increase rate of 50c to 70c per net ton applying on **crushed stone,** carloads (See Note 2), from Bethlehem, Penn., to Allentown, Penn. Reason—Rate of 50c was established to meet trucking competition to Tilghman Street Bridge job at Allentown. As bridge contract is completed there is no longer any necessity for carrying rate.

21737. **Sand,** carloads (See Note 2), from Birmingham and South Pemberton, N. J., to Whitings, N. J., 60c per net ton. To expire June 30, 1930. (Present rate 80c per net ton.) Reason—To meet motor truck competition.

21739. **Crushed stone,** carloads (See Note 2), from LeRoy and Stafford, N. Y., to Gold and Seven Bridges, Penn., $1.50 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

21766. **Crushed stone,** carloads (See Note 2), from Northampton, Penn., to Emaus, Penn., 90c per net ton. (Present rate $1.05 per net ton.) Reason—Proposed rate is comparable with rate from Bethlehem, Penn., to Emaus, Penn.

21767. **Stone, crushed or quarry broken,** carloads. (See Note 2), from Jamesville and Rock Cut, N. Y., to Saco, Penn., $1.65; Lake Ariel, Penn., $1.75 per net ton. (Present rate $2.05 per net ton.) Reason — Proposed rates compare favorably with rates from Jamesville and Rock Cut, N. Y., to Elmhurst, Penn.

21771. **Crushed stone,** carloads (See Note 2), from Rock Hill, Penn., to Robesonia, Penn., $1.25. Reason—Proposed rate compares favorably with rates on crushed stone from Rock Hill and New Hope, Penn., to Hamburg, Penn.

M1240. **Gravel sand,** other than blast, core, engine, fire, foundry, glass, molding, quartz, silex or silica, carloads (See Note 2), from Machias, N. Y., to Allegany, N. Y., 75c per net ton. (Present rate 83c per net ton.) Reason—Proposed rate is comparable with rates on like commodities from and to points in the same general territory.

M1245. **Crushed stone,** carloads (See Note 2), from Bound Brook, N. J., to Elizabethport, N. J., to Perth Amboy, N. J., inclusive, 60c per net ton; also **sand and gravel,** carloads (See Note 2), from South Lakewood and Farmingdale, N. J., to Elizabethport to Keasbeys, N. J., inclusive, 60c per net ton. Rates to expire December 31, 1930.

M1247. **Washed sand,** carloads (See Note 2), from Perth Amboy to Irvington and Newark, N. J., 60c per net ton. Rate to expire one year from date effective. Reason—To meet water competition.

21782. **Crushed stone,** carloads (See Note 2), from Raphine, Va.

To—	Proposed rates	Present rates
Staunton, Va.	80	139
Verona, Va.	90	139
Fort Defiance, Va.	90	151
Mt. Sidney, Va.	90	151
Cave Station, Va.	90	164
Mt. Crawford, Va.	100	164
Pleasant Valley, Va.	100	176
Harrisonburg, Va.	100	189

Reason—Proposed rates are same as now published from Staunton to Valley Railroad points for similar distances.

21783. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Bacon Hill, North East, Charlestown and Principio, Md., to Wye Mills, Bloomingdale and Queenstown, Md., $1.25 per net ton. Present rate, $1.60 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

17864. To cancel commodity rate of $2.77 per net ton on **crushed stone,** from Bethel, Vt., to Brighton, Mass., and apply in lieu thereof sixth class rate of 22c per 100 lb., as named in C. V. Ry. I. C. C. A8514. Reason—Rate obsolete.

17865. To cancel commodity rate of $1.64 per net ton on **stone, rubble or grout,** from Monson, Mass., to Springfield, Mass., as named in Item 15 in C. V. Ry. I. C. C. A6458, and apply in lieu thereof rate of 10½c per 100 lb., as named in C. V. Ry. I. C. C. A8514. Reason—Rate obsolete.

17866. To cancel commodity rate of $1.89 per net ton on **stone, waste,** from Monson, Mass., to Winchendon, Mass., as named in Item 20 of C. V. Ry. I. C. C. A6458, and apply in lieu thereof rate of 14c per 100 lb., as named in C. V. Ry. I. C. C. A8514. Reason—Rate obsolete.

17869. To cancel commodity rate of 10c on **stone, rubble,** from Monson, Mass., to North Grafton, Mass., as named in C. V. Ry. I. C. C. A6458, and apply in lieu thereof sixth class rate of 13½c. Reason—Rate obsolete.

Reassign Dates for Hearing on South Carolina Gravel Rates

THE HEARING on Docket No. 22109, rates on sand, gravel, crushed stone and chert within the state of South Carolina, has been reassigned for November 12, 1929, at Columbia, S. C., before Examiner Hurley.

New Rates on Stone from Ohio to Detroit Suspended

BY an order recently entered in Investigation and Suspension Docket No. 3352, the Interstate Commerce Commission suspended from September 15, 1929, until April 15, 1930, the operation of certain schedules as published in supplement No. 1 to Pennsylvania Railroad Co.'s tariff I. C. C. No. 135; supplement No. 24 to Cleveland, Cincinnati, Chicago and St. Louis Railway Co.'s tariff I. C. C. No. 8423; supplement No. 44 to New York Central Railroad Co.'s tariff I. C. C.-OC No. 230, and other tariffs.

The suspended schedules propose changes in rates on crushed stone, limestone, screenings, etc., carloads, from producing points in Ohio to Detroit, Mich., resulting principally in increases.—*U. S. Daily.*

Texas Cement Rate Authorized

APPROVING an application of the Texas & New Orleans Railroad, the Texas Railroad Commission authorized a rate of $14.50 a car on cement, carloads, from Houston to Streets Spur. It is to be used as a basing rate, not as a factor in dividing through rates.—*Dallas* (Tex.) *News.*

Safety Is Theme at Portland

Cement Mills of Pacific Northwest Meet to Reduce Mishaps

IN THE PRESENCE of the largest group of its operating officials ever assembled in the Pacific Northwest, member mills of the Portland Cement Association in Oregon, Washington and British Columbia held their first regional safety meeting at the Multnomah Hotel, Portland, Ore., on Wednesday, September 18.

L. C. Newlands, vice president and general manager of the Oregon Portland Cement Co., acted as general chairman. The attendance included 70 registered delegates. The meeting was opened auspiciously by Mayor George L. Baker of Portland, whose hearty note of welcome and appeal for interest in community safety formed an appropriate prelude.

Mill Safety From Medical Man's Viewpoint

Statistical reports on cement mill accidents were read by A. J. R. Curtis, of Chicago, assistant to general manager of the Portland Cement Association, after which Dr. W. H. MacDougall, surgeon of the Oregon Portland Cement Co., at Oswego, Ore., spoke on "Mill Safety from a Physician's Viewpoint." Mr. MacDougall said in part:

"Striking results began to be obtained in public health when people got over their fatalistic ideas of disease. They soon followed their conviction that disease is preventable with active co-operative effort to accomplish prevention. There is a similarity in the case of personal injury accidents. Where they are viewed as a sort of ill luck or unavoidable misfortune, such mishaps naturally run high. But where the workmen

L. C. Newlands, general chairman, regional safety meeting, Portland, Ore.

are convinced that accidents are avoidable, they may be induced to co-operate toward this end and a reduction of accidents proportionate to their efforts is sure to result.

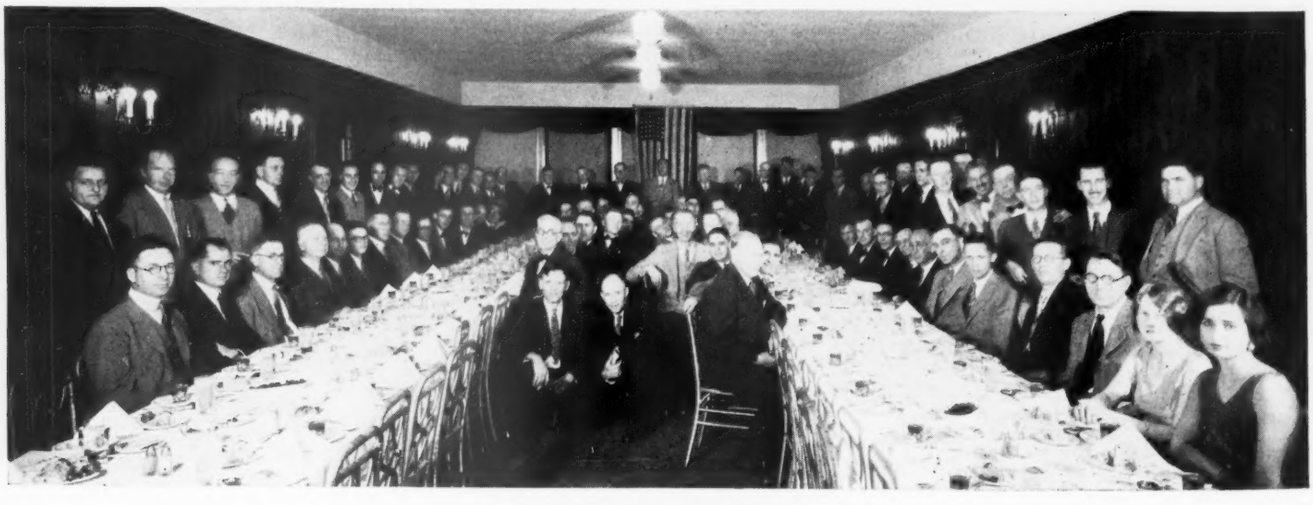
"When we say accidents are preventable, their occurrence commonly infers negligence on the part of the injured workman although negligence, in the ordinary sense, is not always contributory to an accident. Unfortunate men suffering from physical defects are often condemned of contributory negligence on purely circumstantial grounds.

"It is well known that poor health plays a prominent role in the production of accidents in industry. All of us can recall times when we have felt 'below par,' and that at such times we make mistakes despite our best efforts to do otherwise. Consider the situation of a workman who is 'below par' all of the time because of poor eyesight, deficient hearing or general disability. A careful analysis in some of our accident cases creates pity rather than condemnation of the human who is involved.

"Officials of the Oregon Portland Cement Co. have believed that accidents were not caused solely through negligence, but that physical defects would play their part; consequently, physical examination of all new employes has been introduced. The main object of the examination is to help the workman to realize his own physical limitations, leading to the correction of such defects as may need attention.

"The first few applicants resented this new, and as they thought, unnecessary procedure; but when it was explained that the company defrayed the cost and that their physical condition was of far greater importance to themselves than it could possibly be to the company, antagonism disappeared. The workmen soon began to realize that the plant which was giving them a job was also helping them to do more efficient work with less tear on the human system by detecting and correcting defects.

"Poor health, in addition to swelling the accident list, provides disgruntled individuals



Safety dinner, regional safety meeting of Portland Cement Association, Portland, Ore.

who are trouble makers in various ways. Get rid of the cause and you have gone a long way toward creating a harmonious, efficient organization."

In response to an inquiry Dr. MacDougall also spoke very interestingly on the subject of infections. "There is a fearful lack

C. N. Reitze, dinner chairman

of ordinary common sense information" said he, "about the treatment of small wounds and bruises. The safe practice is to use iodine of proper strength or an equally acceptable antiseptic before attempting to clean out a wound. Otherwise infectious substances already there may be rubbed in or infectious substances from new sources introduced. Apply the antiseptic first, then clean out the wound if necessary.

"Never attempt to clean a wound by rubbing circumferentially, or in circles. Make the movement radially, that is, away from the center. Don't apply any substance to a wound except those recommended by your physician for such use. Should you be without sterile bandages, any cloth may be used in an emergency, provided it is first rendered relatively sterile by singeing lightly over a flame.

"Beware too tight bindings in emergency in stopping bleeding. It is far better to apply pressure locally. Almost any ordinary case will stop bleeding within half an hour so that all pressure may be removed."

Following Dr. MacDougall's talk, Dr. W. H. Belknap, a prominent eye, ear and throat specialist of Portland, gave an interesting address on eye injuries. Dr. Belknap's talk created a better idea of the necessity and value of caring for the eyes and greater attention to eye protection may be expected in the mills represented in the audience.

A Contractor's View of Accident Prevention

One of the most beneficial numbers on the program was a paper presented by G. B. Herington, executive secretary of the Portland (Ore.) Chapter of the Associated General Contractors of America, on "Accident Prevention, Looking Backward and Looking Forward." Mr. Herington's paper in part was as follows:

"There was a period not so long ago when from time to time we went to court and looked at men maimed in industry and transportation while they sought relief before the law. And we listened to learned dissertations on the fellow servant rule and the doctrine of contributory negligence.

"It was no so long ago that the ambulance chaser and the claim adjuster raced for the home of the stricken man, the one to get a 50-50 lawsuit and the other to get a release, each judged as to his value to the firm of lawyers or the industrial concern he represented by his batting average in bringing home the suit or bringing in the release.

* * * * * * *

"Industry has been departmentalized, delegation has grown, business enterprises cooperate with other like businesses, exchange data, develop new common practice, determine, recognize, deplore and reduce wastes and scientifically study every phase and speed and contact in today's business laboratory.

"In all this accident prevention has been found and has taken its proper place. Accidents represent waste, economic, humanitarian wastes and as such have become a reflection on management. Statistics in plenty have been developed on the cost of accidents, on their insurance hazard, on their stoppage and turnover cost, on the human wastage, and the losses to dependents; and yet the remaining human suffering has found no equation, only better means of restoration in part or in whole of the man to productivity after the suffering, if he be not beyond the ability to work.

"The late Julius Kruttschnitt, brilliant executive and administrator of the destinies of the Harriman Lines, insisted that every accident on those lines be investigated by the responsible officers and that a cause be found, responsibility located and a remedy applied, if not then such procedure must come from the group of officers to whom the first group reported—some responsible group must find the cause, sift it, determine it—for he said 'there is a cause for every accident and if found we can prescribe a cure; if we can prescribe a cure we can apply it; if we do not apply it the guilt is on our heads.'

"From this inspiration has come a wonderful record by the lines he managed, a record which live today. *Inspiration comes from the top.*

"But merely finding out why accidents happen after the damage is done has not lessened the waste of those accidents which have occurred. True we may say in theory that the same type of accident should not happen the second time and the waste be repeated under good, careful management.

"And while this is true in theory it may become true in practice only as we are sure all the contributing causes have been found and remedied; the burden is thus on management to determine the causes.

"The total of anything is the sum of its parts. So in prevention of recurrences, the whole cause is the sum of the part causes.

"What are these parts, say in a factory?

"*First*—we have *environment,* light, visibility of moving parts.

"*Second, accessibility* of moving parts for free and unhazardous contact as needed.

"*Third, protection* of approach and the necessary contact.

"*Fourth, systematic inspection* and routine repair.

"*Fifth, responsible check* on the facts and continuing integrity of the facts of these first four factors.

"The above is the series which management and proper planning can develop in the tools, equipment and physical plant. We can blue-print these, we can calendar them and we can know they are all maintained.

G. B. Herington

"The next is the human series. Someone has said, 'The greatest safety device is the careful man.' Someone else has stated and statistics bear out that but 10 to 15% of accidents can be said to have had their prevention assured by devices, contrivances and mechanical aids. Checking our first series of five thus leaves are to be had of 85 to 90% of accidental occurrence hazards. This great balance is composed of human causes. What can we do for these?

* * * * * * *

"The plant safety committee must have inspiration. Again it must be organized and meet regularly, hear and digest every suggestion made, and it must respect these suggestions and courteously dispose of them in some definite manner. The maker of these is thinking in terms beyond his immediate responsibility; he is expanding when he makes them, and if he is high hatted by the committee, he will jolly well keep still thereafter. This committee has some delicate diplomatic functions to exercise. When a suggestion has been made and partly or wholly adopted the maker should be recognized; this inspires others to do likewise. *Faith must be kept, confidence developed, application of the good ideas made* or the good inspiration may be mistaken for insincerity.

"So much for the regular men who are aboard during the starting and the progress. Newly employed men should be known as physically fit. Someone should be held responsible for making them 'Safe minded.'

"In one great shop I know of there is a unique form of discipline on the accident

prevention program. It works like this. A big machine is being placed. Orders are that no one may go under the bed of this machine until the blocking is all in. One man gets in a hurry and crawls under. Called out, he is quietly sent home for the balance of the day and told to 'Think this over with your family on the company's time instead of in the hospital on your own time.' He becomes 'safety conscious.' The balance of that squad becomes 'safety conscious.' The idea is drummed home, by talks, meetings, safety suggestion boxes, bulletins, signs and constant executive effort to inspire and progress. And as a net result, men become careful of their own and their fellow's safety.

C. R. Neins, P.C. A. district engineer, Portland, Ore.

* * * * * * *

"Can we afford to do less for the promotion of safe practices, and for the evolution of processes eliminating costly accident wastes than for a new way of getting cement bags more cheaply into a car, or for a new pyrometer to help burn the cement more economically?

"Can we afford to approach a subject teeming with human reactions, inhibitions and exhibitions, with anything less than laboratory precision and system?

"Our American management has produced in mechanical device and quantity production a developed concentration of intricate technique and perfection of synchronous method that has led off the newer economic trend of the nation. Can not this management apply a little of this same type of inspiration to reducing hazards? Of course.

"The newer management weighs and balances the human factor, knows the man and the machine are a harmonious twain for production, knows the co-operation of man and management to be an essential and knows that so co-operating all labor difficulty is reduced in the common interest and a mutually valuable result attained.

"American management can quickly see the advantage of safe operation, steady personnel; it can see the lessened premium on its compensation insurance that can only be granted on demonstrated decreased hazard and it can see shame in waste ungarnered.

"American management offers great hope for the prevention of accidents. It analyzes, determines, decides; it inspires and co-operates; it can manage business safely, both in the financial sense and in the human sense."

Describes Oswego Campaign

D. K. Dalzell, chief electrician of the Oswego mill, next read the following paper describing the 1928 safety work at that plant, under the heading of "Putting Punch into a Safety Campaign":

"Putting the punch in a safety campaign is a subject upon which a great deal may be said. Innumerable schemes could be suggested as to how to create and maintain interest and co-operation in safety work. However, I shall confine myself to the methods used by the Oswego plant of the Oregon Portland Cement Co., which culminated in a successful campaign for the year 1928 and brought us the coveted association trophy.

"At a meeting early in the year it was suggested that the employes be divided into two groups or teams. This met with general approval and a captain was elected to head each team. Each member of a team was to report to his captain anything that would tend to promote safety work. The captains were no sooner elected than one challenged the other, the losing team to provide a dinner for the winner. This served to create a spirit of friendly rivalry that was very much apparent throughout the year. A system of debits and credits was worked out whereby a team was penalized if a member failed to report an accident within a specified time or did anything that would jeopardize his own safety or that of his fellows. On the other hand a team would be credited with points if the members were prompt in reporting accidents, and for making suggestions as to improvements in safeguards. A score board was erected to show the daily standing of the teams.

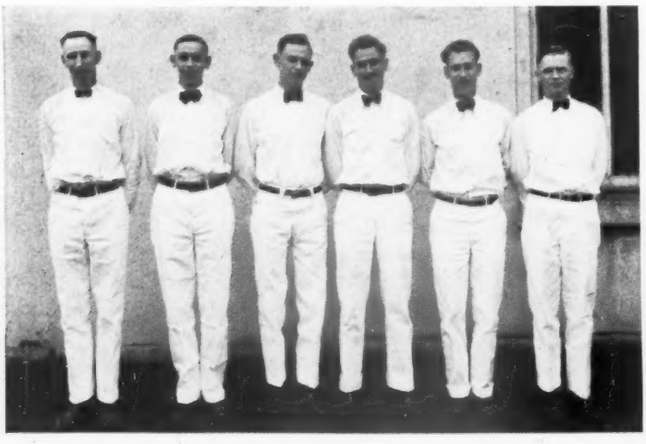
"A small weekly paper posted on the bulletin board noted especially valuable safety suggestions, reminded us of the goal for which we were striving, and repeatedly urged us to keep up the good work. Excerpts from other safety papers with a joke or two interspersed kept everyone watching for the next issue. One of our men who is something of an artist contributed sketches of various individuals about the plant which also added to the interest in the paper.

W. H. Fitzgerald, who spoke on accident prevention at the Portland meeting

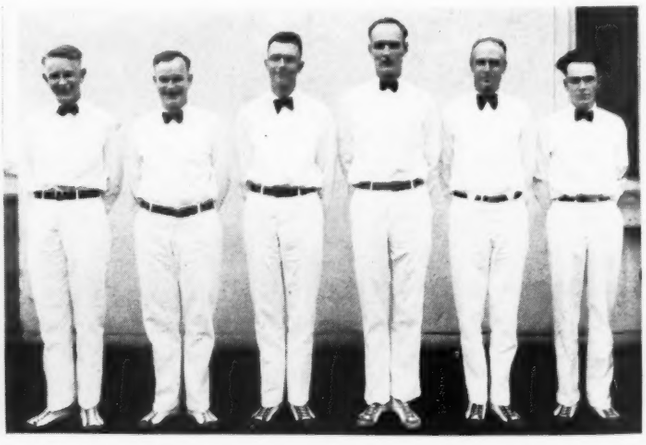
G. M. Aitken, banquet toastmaster

"The campaign along these lines resulted in our finishing the year 1928 without a single lost-time accident and brought to us the realization of our aim for the past six years.

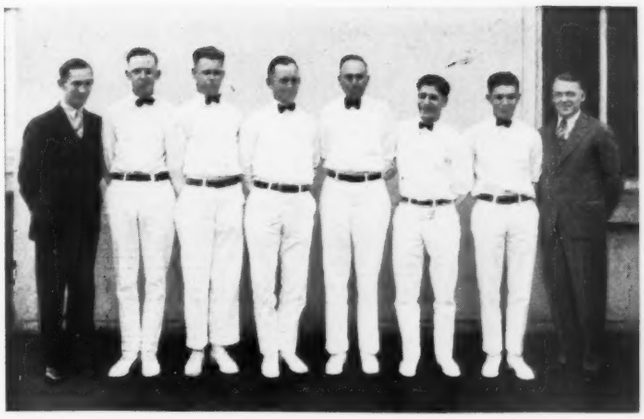
"Our campaign for 1929 includes those policies found so efficient in 1928 with the addition of several others which seem to us of great value. In the spring of the year a class was organized and received instruction in first-aid work. All members of the



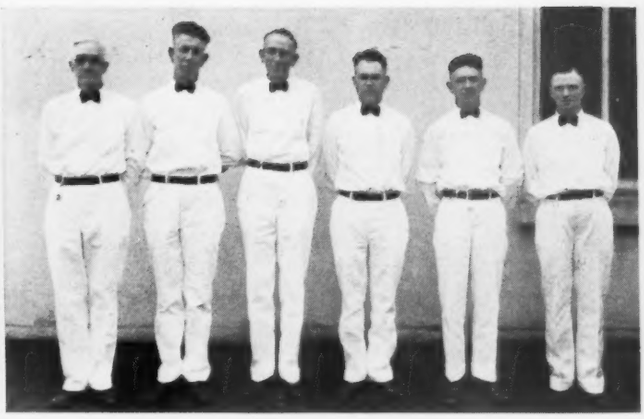
First aid team, Oswego plant, Oregon Portland Cement Co. —cup winners at Portland safety meeting



First aid team of Oregon Portland Cement Co. plant at Lime, Ore.—awarded second honors



First aid team, Superior Portland Cement, Inc., Concrete, Wash.



First aid team, Olympic Portland Cement Co., Bellingham, Wash.

class passed the examination with very creditable standings, and at a banquet and demonstration held in July, were complimented and encouraged by men competent to judge the results of our efforts.

"I understand that it is the policy of this company to organize a class each year for first-aid instruction until all employes have been given this work.

"In our quarries, which are detached from the plant, safety teams are organized, first-aid instruction has been started, and every effort is being made to interest and encourage the men in safety work.

"The safety committee at a monthly round-table discussion, take up the significant accidents reported by the association and endeavor to find out why they happened and what precautions seem advisable to prevent repetition. In our own plant a committee has been appointed to investigate the cause of all accidents and to place the blame if aught there be. Also a safety manager has been appointed to take charge of all safety work. It seems to me that a successful safety engineer might easily combine the virtues of a social worker, a detective, and a college cheer leader. I believe we have picked the right man."

The remainder of the program was as follows:

Luncheon—N. D. Moore, vice president, Pacific Coast Cement Co., presiding.

"Accident Prevention from the Executive's Viewpoint."

Afternon Session—D. L. Carpenter, president, Beaver Portland Cement Co., presiding.

Address by W. H. Fitzgerald of Oregon Industrial Accident Commission.

Round Table Discussion—

"The Quarry"—Led by A. F. Krabbe, superintendent, Olympic Portland Cement Co.

"The Mill"—Led by H. R. Shipley, superintendent, Oregon Portland Cement Co., Oswego Plant.

"Packing and Shipping Departments"—Led by D. C. Gloag, timekeeper, British Columbia Cement Co.

First-Aid Contest—

Competing first-aid teams from cement plants throughout the Northwest.

Directed by officials of the American Red Cross and U. S. Bureau of Mines.

Safety Dinner—Chester N. Reitze, vice president, Superior Portland Cement Co., chairman.

George M. Aiken, safety engineer, Oregon Industrial Accident Commission, toastmaster.

Safety Songs—Led by Song Leader and Accompanist.

Address by N. M. Sloan, safety engineer, Pacific Telephone & Telegraph Co.

First-Aid Winners

In the spirited first-aid contest, which included a series of four problems, the Oswego plant team was adjudged winner and to it a bronze loving cup was presented. Other three teams entered represented the Bellingham (Wash.) plant of the Olympic Portland Cement Co., the Concrete (Wash.) plant of Superior Portland Cement, Inc., and the Lime (Ore.) plant of the Oregon Portland Cement Co.

Registration

Beaver Portland Cement Co., Portland, Ore.
D. L. Carpenter, president.
Buell C. Nelson, assistant secretary.
Frank Pennypacker.

British Columbia Cement Co., Bamberton, B. C.
Duncan Gloag, timekeeper.
Norman Tucker, driller.

Olympic Portland Cement Co., Bellingham, Wash.
Harry W. Bennett, repairman.
William Chesney, miller.
Paul Kaylor, chief electrician.
R. H. Kendall, raw miller.
A. F. Krabbe, manager.
F. W. Leitner, oiler.
J. C. Ristine, quarryman.
G. M. Watson, foreman.
Frank Zettle, dryerman.

Oregon Portland Cement Co., Portland, Ore.
H. L. Knappenberger, secretary and treasurer.
David Leche, general superintendent.
L. C. Newlands, vice-president and manager.

Oregon Portland Cement Co., Oswego (Ore.) plant
J. H. Adams, chief operator.
R. W. Anderson, chief chemist.
R. F. Antonsen, analysist.
C. S. Brown, electrician.
D. E. McCormick, raw operator.
D. K. Dalzell, electrician.
H. L. Fox, crusher foreman.
J. C. Haines, packing foreman.
Jack Hawke, chief operator.
H. E. Johnson, machinist.
Otto Johnson, machinist.
A. J. Lick, yard foreman.
Fred Low, shovel operator.
T. G. Ludgate, chief chemist.
Dr. W. H. MacDougall, plant surgeon.
A. W. Martin, safety engineer.
J. L. Nemec, sack department.
Arthur Reiber, laborer.
H. R. Shipley, superintendent.

Oregon Portland Cement Co., Lime (Ore.) plant
T. F. Anderson, burner.
L. Carlson, miner.
W. K. Douglas, bookkeeper.
V. Lugnet, assistant chemist.
L. McLean, electrician.
H. H. Tague, assistant timekeeper.

Oregon Portland Cement Co., Roseburg (Ore.) quarry
J. B. Bywater, superintendent.

Oregon Portland Cement Co., Dallas (Ore.) quarry
Charles Burkes, foreman.

Pacific Coast Cement Co., Seattle, Wash.
Ralph C. Dean.
G. C. Hewitt, supervisor of safety.
Darwin Meisnest, assistant sales manager.
N. D. Moore, vice-president.

Superior Portland Cement, Inc., Seattle, Wash.
C. N. Reitze, general manager.

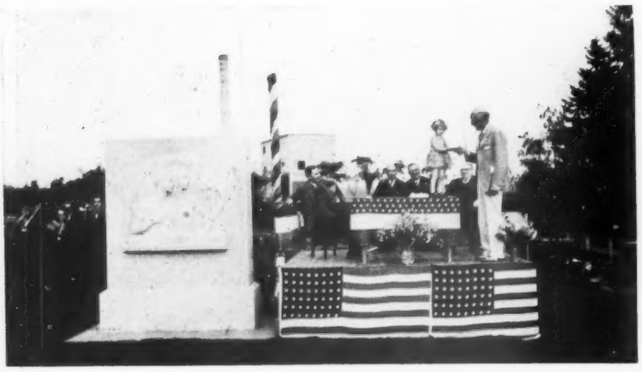
Superior Portland Cement, Inc., Concrete (Wash.) plant
H. A. Ambler, superintendent.
W. F. Bake, crusher foreman.
John A. Bitonti, miller.
H. G. Carlton, assistant traffic manager.
Oscar Haussler, substation operator.
C. T. Jungblon, craneman.
W. F. Jungblon, packer.
R. A. Lang, quarry foreman.
A. Patterson, quarry.

Others
George M. Aitken, safety supervisor, Oregon Industrial Accident Commission, Salem, Ore.
Dr. W. H. Belknap, specialist on treatment of the eyes, Portland, Ore.
A. J. R. Curtis, assistant to general manager, Portland Cement Association, Chicago, Ill.
E. B. Ferguson, National Safety Council, Portland, Ore.
W. H. Fitzgerald, commissioner, Oregon Industrial Accident Commission, Salem, Ore.
G. B. Herington, executive secretary, Portland Chapter, Associated General Contractors of America.
W. B. Lenhart, associate editor, ROCK PRODUCTS, Chicago.
K. A. Merriman, manager, Trojan Powder Co., Portland, Ore.
Charles B. Neins, district engineer, Portland Cement Association, Portland, Ore.
George Peters, equipment foreman, Pacific Telephone and Telegraph Co., Portland, Ore.
H. H. Sanderson, president, Sanderson Safety Appliances Co., Seattle, Wash.
John Schoning, safety engineer, United States Bureau of Mines, Seattle, Wash.

Mineral Resources of Wyoming

UNDER the title, "Developed and Undeveloped Mineral Resources of Wyoming," the Wyoming geological survey has brought out a comprehensive statistical compilation and industrial evaluation on the sundry metallic and non-metallic minerals, chemical salts, fuels and power producers of that state. The book is conventionally divided off into chapters and carefully indexed.

A number of general economic papers relating to the mineral and other industries in the state are appended. Copies of the book are available at $1 each from the Wyoming Geological Survey, Cheyenne, Wyo.



Unveiling the trophy at the Oswego, Ore., plant, Oregon Portland Cement Co.

Safety committee for 1928, Oswego plant, Oregon Portland Cement Co.

Oregon Cement Mill Dedicates Safety Trophy

Portland Cement Association Award Unveiled at Oswego

ON SEPTEMBER 19, following the regional safety meeting of the cement mills of the Pacific Northwest at Portland, the Oregon Portland Cement Co. dedicated and unveiled its safety trophy awarded by the Portland Cement Association for a perfect safety record during 1928. The occasion, one of the most pleasant and unique of the fourteen similar ceremonies held so far this year, took place on the mill property at Oswego, a suburb of Portland.

The formal ceremony occurred at 4:30 p. m. at the trophy site, located at the entrance to the mill grounds, on the Pacific Highway. L. C. Newlands, vice-president and general manager, presided as chairman of the occasion and was assisted by H. L. Knappenberger, secretary-treasurer, and David H. Leche, general superintendent of the Oregon Portland Cement Co. After an opening number by the band Mr. Newlands opened the ceremony by reciting the record of the Oswego mill and introducing A. J. R. Curtis, who was present to turn over the trophy on behalf of the Portland Cement Association. Mr. Curtis said:

Speech of Presentation

"Two years ago I had the pleasant opportunity of meeting with your genial vice president and your splendid mill organization in the club house at Oswego on an occasion devoted largely to creating new enthusiasm for accident prevention work at your mill. It was a great meeting and it closed with real determination evident everywhere. Addressing you now, after your significant success in safety work last year, I feel in the same predicament as one who might try to tell Shakespeare about English, Bobbie Burns about poetry or a bishop about religion.

"You have demonstrated since we were together at that meeting, that intelligent training, eagerness to co-operate with one another for the attainment of a common objective and a brotherly regard for the welfare of fellow workers are the most dependable preventatives for accidents. Therefore, I congratulate you all most sincerely on the wonderful showing that has been made.

Those who are acquainted with even a few of the hazards with which men are confronted in the manufacture of cement will marvel that any mill organization could have made so fine a record. Only a short time ago it was conceded that a mill had to have accidents and many of them. But you have accomplish that which seemed impossible and, thereby, brought to your plant the most distinguished honor which our industry has to bestow.

"Your representatives, Messrs. Shipley and Haines, received the formal award of the trophy for you at New York on May 21. Therefore it is my privilege, acting on authority of the Board of Directors and on behalf of the members of the Portland Cement Association throughout America, to turn over to you the Portland Cement Association safety trophy for 1928 and with it congratulations and best wishes to every member of your organization who has contributed to your splendid record. In presenting you with this trophy it is the hope of the association that you may repeat this splendid record often during years to come.

"The concrete monument which we are dedicating here today is unique in that it is erected in honor of the living rather than the departed. It symbolizes achievement, rather than bereavement. It stands here overlooking this great plant, throbbing with productive activity, in happy contrast with the sombre setting of monuments which stand in the silent cities of the dead. Rather than a token of work laid down, it expresses acknowledgment of a work well begun.

"The need for safe thinking is prepetual and no season, month, day or instant, is free from the possibility of injury unless every man in your organization is constantly on the alert. We sincerely hope that this monument, bearing new inscriptions commemorating future perfect records, will serve as a constant inspiration and reminder."

At the conclusion of the speech of presentation the trophy was unveiled by Miss Shirley Johnson, small daughter of one of the mill employes, while the Jefferson High School Band, of Portland, played "Stars and Stripes Forever." David H. Leche, general superintendent, then accepted the trophy, his remarks being as follows:

Accepts for Mill

"It is indeed with great pleasure that I accept this trophy on behalf of the employes of the Oswego plant and the Roseburg and Dallas quarries of the Oregon Portland Cement Co. and wish to thank you, Mr. Curtis, for this trophy that you have presented to us on behalf of the Portland Cement Association as a reward for our year of operation with no loss of time through accident.

"I feel sure that as time goes on all of us will come to realize more fully what this trophy represents. We all know that it represents hard work, co-operation and loyalty in accident prevention, but I for one feel that it represents more than just hard work, co-operation and loyalty. To me it is an emblem representing the saving of heartache, sorrow, pain and many other intangible things as well.

"If each accident that occurs could be corrected in its entirety with an expenditure of a little money it would be a simple matter, but money will not replace the lost life or limb, or the sorrow and pain caused by an accident, so therefore I again reiterate that as time goes on we all will come to realize that this trophy is an emblem with a deep significance.

"The receipt of this trophy is the culmination of five years of effort on our part and

is the first tangible thing that the employes of this company have to show for their efforts, and it is hoped that it will be a constant reminder to us all to practice 'Safety First.'

"The winning of this trophy was not made possible by the efforts of any one individual but by the combined help of all of the employes of this plant and it is for this reason that each one of us should feel proud of his share in this trophy and what it represents.

"Some may think that because we have attained this goal we may have reason to let up in our accident prevention efforts. This I assure you is not the case. All of us are working as hard now as we did before we reached this goal.

"In conclusion I wish to say that I regret that in so far as this year is concerned we will not be eligible for a trophy because we have had several serious accidents that caused lost time, notwithstanding the fact that we have worked as hard if not harder than before. However, we can now make sure that we go through the rest of this year without accidents and work during 1930 to be listed with the winners again."

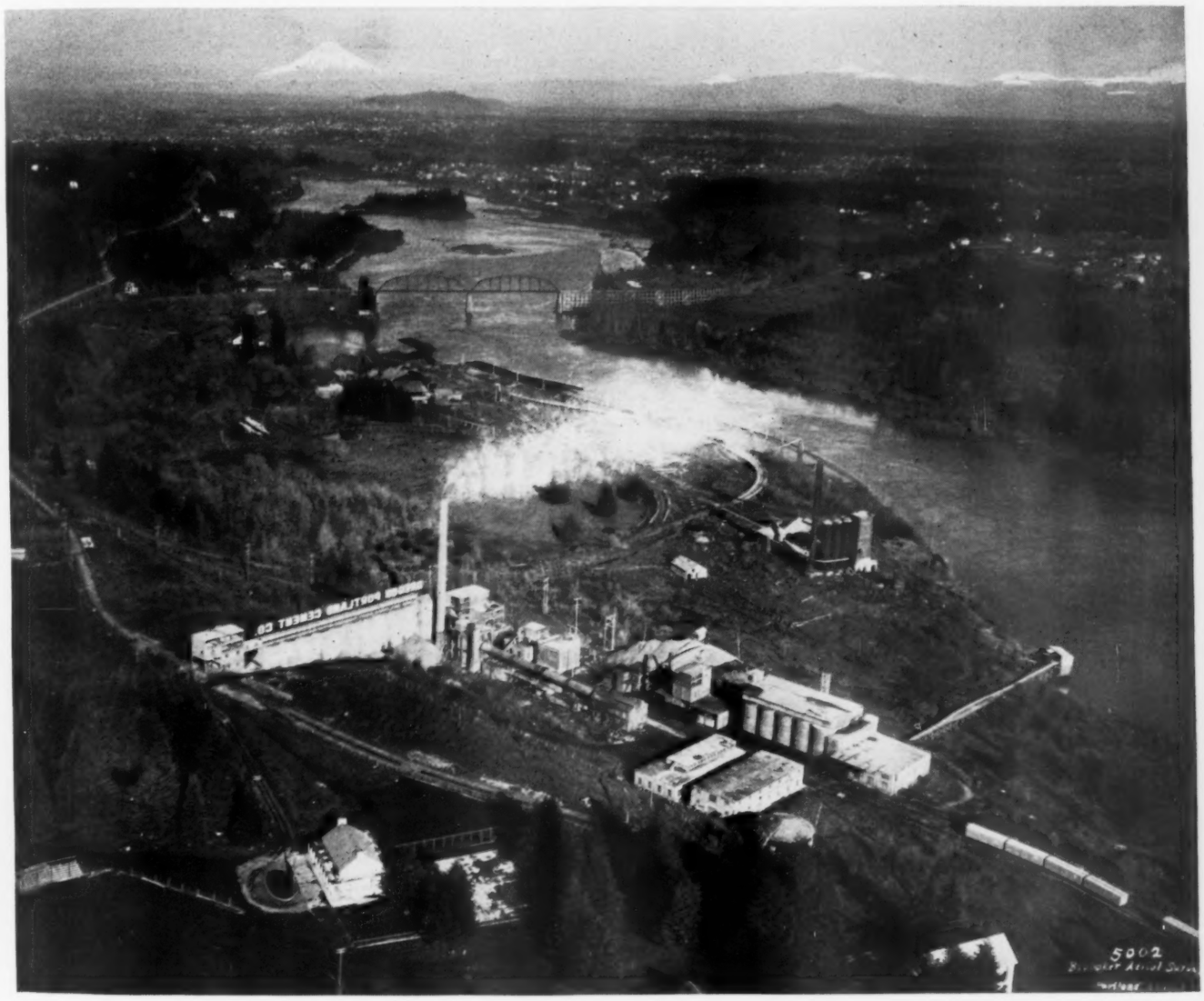
Senator Joseph E. Dunne, who was present as the representative of the citizens and industries of Portland and vicinity congratulated the mill organization and paid high tribute to the humanitarian cause which the occasion represented. H. L. Knappenberger then closed the affair very pleasantly by thanking the large assemblage of workmen and their families and visitors and extended a cordial invitation to all to partake of the picnic supper which was served at the plant club house and surrounding park, with the Oregon Portland Cement Co. as host.

Plenty of Entertainment

Preceding the formal dedication an enjoyable program of entertainment had been laid out by Mr. Newlands and his committee. Visiting executives of the Oregon and Washington cement companies were the guests of Mr. Newlands in the morning at a golf game at Lake Oswego Country Club. Other visitors were taken for a drive to show places in the vicinity and to the Oswego mill for an inspection. Public schools of Oswego were dismissed at noon and the children marched to the mill club house and park where a schedule of twenty contests and many games was conducted and prizes awarded by Superintendent H. R. Shipley.

A number of contests were also arranged for the men and women, providing much amusement and a general spirit of community friendliness and good will toward the Oregon Portland Cement Co.

The following were patrons of the day: R. P. Butchart, president; H. A. Ross, vice-president; L. C. Newlands, vice-president and general manager; H. L. Knappenberger, secretary and treasurer; E. B. Ireland, D. J. Malarkey, and Edward Cookingham, directors; F. E. McCaslin, assistant secretary; D. H. Leche, general superintendent, and H. R. Shipley, superintendent.



Airplane view of the Oswego, Ore., plant, one of the safety trophy winners for 1928

Mineral Aggregate Industries Unite in Demand for Cleaner Cars*

National Associations of Sand, Gravel, Crushed Stone and Slag Producers Submit Convincing Data and Figures to American Railway Association

FOLLOWING is the full text of the letter addressed to the American Railway Association which accompanied the reports of the aggregate associations. It was signed by J. C. Buckbee for the National Sand and Gravel Association, by F. T. Gucker for the National Crushed Stone Association and by L. E. McDermut for the National Slag Association:

"The sand and gravel, crushed stone and crushed slag industries are suffering from a heavy expense due to the necessity for cleaning and repairing open-top cars delivered to them by the carriers for loading.

Aggregate Associations Make Surveys

"A careful survey of the situation has been made by the national associations of each of these industries in order to determine the cost of the burden and to secure data which may be used in improving the situation in the interests of both the carrier and the shipper. We are attaching hereto copies of the surveys made by each of the associations.

"It will be observed from the survey of the National Sand and Gravel Association that a total of 89 producers furnished information concerning the cost which they incurred in cleaning and repairing cars for loading. Approximately 450,000 cars are included in this survey. The average cost of cleaning and repairing a car is shown to be 46.5 cents.

"The National Crushed Stone Association survey covers the experience of 77 plants with a total loading of approximately 300,000 cars in 1927. The average cost in this industry for cleaning and repairing railroad cars is shown to be 26.7 cents.

"The National Slag Association report covers the experience of six plants shipping approximately 100,000 cars. The average cost of cleaning and repairing cars in the slag industry is shown to be 38.4 cents.

"The surveys conducted by the associations have covered the United States irrespective of membership in these organizations. It affords, therefore, a cross-section of the experience of the three industries throughout the country and, we believe, shows quite accurately the conditions as they exist. As might well be expected, errors have been made by some of the companies in calculating the average cost in cleaning and repairing cars. We have, accordingly, compiled the average figures given above by considering only total figures for given sized groups or the survey as a whole.

"The sand and gravel, crushed stone, and slag industries in 1927, the year covered by the surveys, shipped approximately 2,300,000 cars, so that it is evident in the light of figures given above that the cleaning and repairing of cars placed for shipment cost these industries approximately one million dollars.

Consignee Should Clean Cars

"The necessity of cleaning cars placed at our plants for loading arises from the neglect of the last consignee to remove the contents of the car he received. Obviously his carelessness should not result in imposing a burden either upon the carrier or the shipper that next receives the car for loading.

"The railroad company in the first instance delivered a clean car to the first shipper, as the car was new. The first consignee and all that followed him should, in justice to the railroad company as well as in justice to the next shipper, return the car in clean condition ready for the next loading.

"So far as we know, there is no order of the Interstate Commerce Commission which stipulates that a consignee must clean a car thoroughly before returning the car to the carrier. We feel that such an order should be issued. We further feel that where the provisions of the order are neglected the carrier should refuse to accept the return of the car and should be empowered to apply demurrage charges until the consignee cleans the car.

Types of Cars Used

"Our surveys have developed some interesting data concerning the types of railroad cars required by the trade. We believe that this information will be of interest to the American Railway Association in a determination of the proper type of equipment to be assigned for the loading of our materials.

"It is indicated in the survey of the National Sand and Gravel Association that the drop-bottom type of gondola car is the most expensive car to clean and repair and it is also the car which suffers most in service. It will be observed from the survey of this Association that approximately 50% of their shipments are unloaded by clamshell buckets; the survey of the National Crushed Stone Association indicates that approximately 31% of their shipments are unloaded by clamshell buckets, and the survey of the National Slag Association brings out that approximately 15% of their shipments are unloaded by clamshell buckets. When clamshell buckets are used for unloading, the solid-bottom type of gondola car is best adapted to the service, as the heavy solid bottom resists the impact of the buckets in a more effectively than with drop-bottom cars.

"Where trestles are provided for unloading, or there are hoppers below the track, the hopper type of car is the more desirable car, as such cars are, in practically all instances, 100% self-cleaning. The drop-bottom car is rarely, if ever, thoroughly self-cleaning.

"It appears from the National Sand and Gravel Association survey that only 13% of their tonnage is demanded in drop-bottom cars. From the survey of the National Crushed Stone Association it appears that only approximately 25% of their tonnage is demanded in drop-bottom cars, while from the survey of the National Slag Association it is evident that less than 1% of their shipments is demanded in drop-bottom cars.

"It would seem to be definitely established by these data that the drop-bottom type of car is not used as extensively in our industries as the other types of equipment. The surveys of the National Sand and Gravel Association and the National Slag Association lend themselves quite definitely to the suggestion that few of such type of cars should be added by the carriers in the future for the transportation of these materials. We would also venture the suggestion that the older and weaker types of drop-bottom cars now in service, might, with good results to both carrier and shipper, be converted into solid-bottom cars when next in the repair shops.

Small Producers Pay Most

"As we anticipated, our surveys show that the cost of cleaning and repairing cars is greater to the small producer than it is to the larger producer. For the purpose of convenient reference, we have divided the producers into several groups according to the size of their production, showing the individual cost to each group as set forth in Table 1.

*Reprinted from *The National Sand and Gravel Bulletin* for September.

"The detailed reports included in the surveys are on file at the offices of the respective associations, and we shall be glad to furnish the American Railway Association with any further information desired.

"It is impossible to obtain data which segregates the average cost of cleaning cars from the average cost of repairing cars. Yet we know from the many complaints we have received from producers that a great many cars placed for loading by the carriers are not in proper condition for loading due to holes in decks and sides, to poorly fitting doors, and other defects in the cars.

TABLE 1. ANALYSIS OF EXPENSE INCURRED BY MINERAL AGGREGATE INDUSTRIES IN CLEANING AND REPAIRING RAILROAD CARS

SAND AND GRAVEL INDUSTRY

Groups	No. of cars	Cost of cleaning and repairing	Average cost per car
1 to 2,000 cars	30,173	$ 27,454.95	91.0c
2,001 to 5,000 cars	120,901	64,492.00	53.3c
5,001 to 10,000 cars	113,820	52,783.33	46.4c
10,001 to 20,000 cars	63,928	30,785.65	48.2c
20,001 and over	120,278	33,323.29	27.7c
	449,100	$208,839.22	46.5c

SLAG INDUSTRY

1 to 2,000 cars	.....	.....	.....
2,001 to 5,000 cars	2,138	$ 1,067,50	49.9c
5,001 to 10,000 cars	8,341	2,070.00	24.8c
10,001 to 20,000 cars	49,455	20,050.00	40.5c
20,001 and over	37,560	14,250.00	37.9c
	97,494	$ 37,437.50	38.4c

CRUSHED STONE INDUSTRY

1 to 2,000 cars	30,732	$ 15,747.78	51.2c
2,001 to 5,000 cars	62,126	20,531.80	33.0c
5,001 to 10,000 cars	37,130	5,500.00	14.8c
10,001 to 20,000 cars	90,958	22,676.24	24.9c
20,001 and over	28,500	2,100.00	7.4c
	249,446	$ 66,555.82	26.7c

"It is undoubtedly the duty of the carrier to furnish the shipper with a car which will transport the commodity safely to its destination, but we appreciate that at the peak of the season when the carriers have demands for great numbers of cars that they can not always furnish cars which are in perfect condition. On the other hand, it is our opinion that greater care should be exercised in the repairing of cars which are to be used in transporting our materials and that great improvement can be made in this direction with a consequent saving to the shipper in the cost of repairing cars and to the railway in reducing claims for materials lost in transit. The feature of safety of operation should not be overlooked in this connection, since leaking cars have been known to derail trains.

"We realize that this general question of cleaning and repairing railroad cars is one which is not new. Undoubtedly, many of the Regional Advisory Boards throughout the country have given consideration to the problem and have undertaken to institute measures which would bring relief to the shippers in the territories covered by such Boards. The industries represented by our associations have been burdened with a heavy expense for several years in placing cars in proper condition to transport their products, and field investigations have disclosed that in many parts of the country the situation is becoming worse rather than better. Our products are sold on a small margin of profit and any additional expense incidental to the cost of production and distribution exerts a more pronounced effect upon our industries than in the case of others with products of a higher unit value.

"Accordingly, after representations from our membership, joint committees were appointed to endeavor to bring some measure of relief to our producers, and we hope that through co-operation with the American Railway Association, a definite improvement in the condition of cars can be effected in the near future. We view the problem as being of mutual interest to our industries and to the railroads, and our surveys have been conducted impartially in order to develop as much information as possible. This having been done, we submit our reports to you for consideration. We believe that a co-operative program should be adopted in which the carriers and our shippers can participate to the advantage of all parties concerned, and we take this opportunity of pledging our co-operation in the carrying out of any program which is decided upon."

Profit from Quarry Inspections

ROCK PRODUCTS, to some extent at least, by descriptions of quarry operations, supplies the desire of every quarry operator to know how the other fellows solve their problems. Another way is for quarry operators themselves to travel about and see some of these operations. A recent visitor in ROCK PRODUCTS office was M. L. Jacobs, manager of quarries of the Bethlehem Mines Corp., Bethlehem, Penn., who was on such an inspection trip to the quarries of Dolomite, Inc., Sturgeon Bay, Wis., the Inland Lime and Stone Co., Manistique, Mich., and the quarries near Alpena and Rogers City, Mich. Mr. Jacobs was enthusiastic over the advantages to him as an operator of such pilgrimages. He was accompanied by Superintendent Peacock of the company.

Importance of Airport Construction

FROM present indications the construction of airports promises to be of much importance to the rock products industry. While many airports are now little more than grass plots, just as the first highways were of turf or dirt, the ultimate in airport construction probably means the use of much sand, gravel, crushed stone and portland cement.

Information compiled and made available by the division of airports and aeronautics of the U. S. Department of Commerce shows that 1,174 new airports are under proposal or construction in the United States, compared to 1,485, including Government ports, which had been established up to July 31, 1929. Represented in the list of contemplated air fields are 47 states, the territory of Alaska, and the District of Columbia.

Pennsylvania, with 64 airports under proposal, is leading the nation in new development. New York and California are each planning 59 more fields, and Texas 56, it was stated.

Photo by Ewing Galloway, N. Y.

Much aggregate is used in asphalting the runways at airports to make them more substantial and dustless

Portland Cement Output in August

Production Decreases 0.9%, Shipments Increase 4.8% and Stocks 3.8% Higher as Compared with August, 1928

THE portland cement industry in August, 1929, produced 18,594,000 bbl., shipped 23,019,000 bbl. from the mills, and had in stock at the end of the month 20,101,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in August, 1929, showed a decrease of 0.9% and shipments an increase of 4.8%, as compared with August, 1928. Portland cement stocks at the mills were 3.8% higher than a year ago.

The output of another new plant, located in Texas, is included in the statistics here presented which are compiled from reports for August, from all manufacturing plants except three for which estimates have been included in lieu of actual returns.

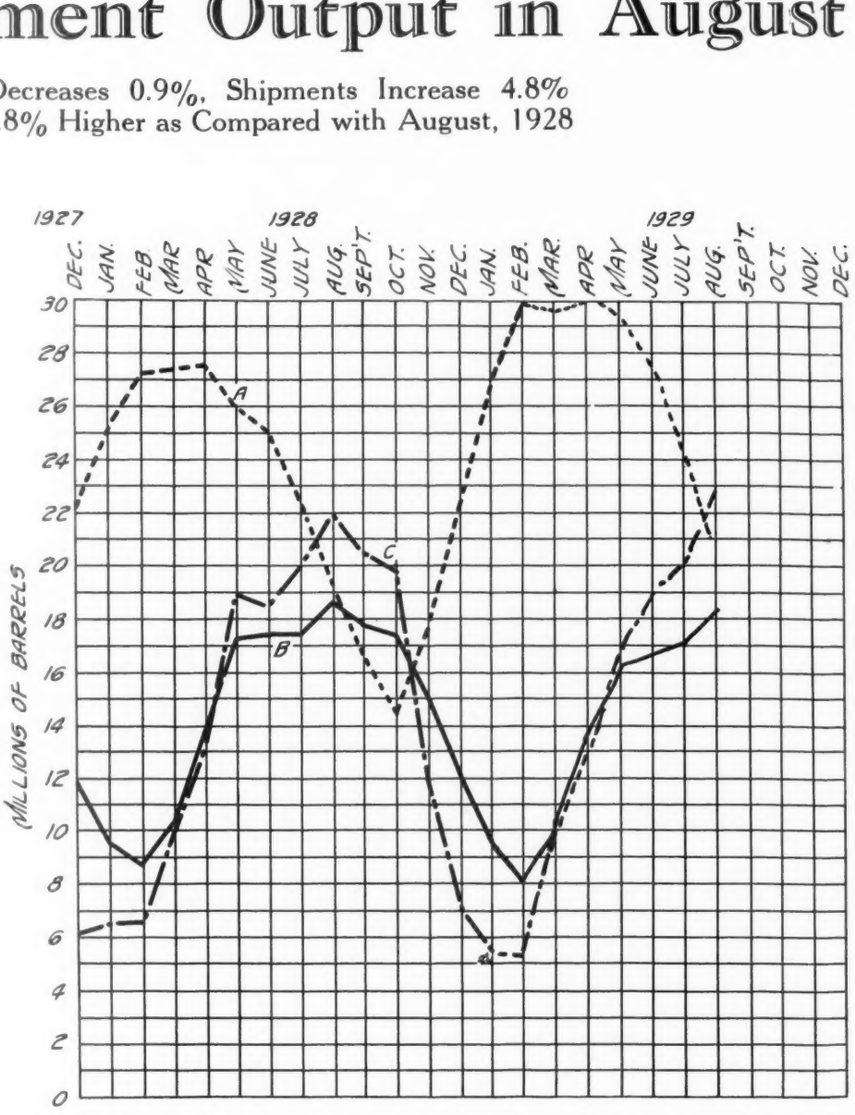
In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 164 plants at the close of August, 1929, and of 159 plants at the close of August, 1928. In addition to the capacity of the new plants which began operating during the twelve months ended August 31, 1929, the estimates include increased capacity due to extensions and improvements at old plants during the period.

RELATION OF PRODUCTION TO CAPACITY

	Aug. 1928	Aug. 1929	July 1929	June 1929	May 1929
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	93.1	86.1	80.4	80.9	76.4
12 months ended	73.5	68.2	68.9	69.0	70.2

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the States to which cement was shipped during June and July, 1928 and 1929:


1927
1928
1929
DEC. JAN. FEB. MAR APR MAY JUNE JULY AUG. SEP'T. OCT. NOV. DEC. JAN. FEB. MAR. APR MAY JUNE JULY AUG. SEP'T. OCT. NOV. DEC.
MILLIONS OF BARRELS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
A
B
C

(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN JUNE AND JULY, 1928 AND 1929, IN BARRELS*

Shipped to	1928—June	1929	1928—July	1929
Alabama	218,443	†156,823	267,843	227,381
Alaska	1,179	1,564	1,496	2,307
Arizona	45,357	76,157	42,336	46,241
Arkansas	94,530	†149,067	123,490	181,615
California	1,135,923	981,611	1,081,470	905,437
Colorado	134,040	105,289	113,414	107,528
Connecticut	274,577	192,236	266,888	213,551
Delaware	31,076	45,544	35,077	43,016
District of Columbia	77,565	†110,966	87,606	118,426
Florida	101,132	†91,946	97,376	99,338
Georgia	151,318	†117,783	135,770	157,113
Hawaii	19,441	22,254	21,832	21,348
Idaho	31,940	31,802	40,823	33,383
Illinois	1,921,820	1,780,688	2,321,485	1,835,790
Indiana	513,118	635,341	712,107	745,533
Iowa	790,414	728,393	873,528	809,784
Kansas	203,747	229,267	215,125	225,611
Kentucky	155,438	164,656	192,746	187,060
Louisiana	107,624	†113,837	113,049	117,311
Maine	69,190	65,594	63,915	73,594
Maryland	240,228	244,635	246,605	305,219
Massachusetts	314,595	293,455	334,822	335,635
Michigan	1,393,059	1,486,439	1,540,219	1,677,282
Minnesota	490,086	456,148	435,564	478,941
Mississippi	90,654	†73,548	90,937	109,161
Missouri	388,090	567,722	484,207	725,967
Montana	57,263	82,861	58,225	67,366
Nebraska	132,088	152,570	110,938	150,214
Nevada	10,583	14,091	10,535	10,841
New Hampshire	52,334	73,359	46,025	98,708
New Jersey	836,204	909,551	861,340	877,662
New Mexico	32,989	32,003	36,795	25,281
New York	2,369,486	2,493,401	2,480,799	2,598,425
North Carolina	253,034	†179,957	221,912	171,148
North Dakota	89,107	81,746	72,490	69,425
Ohio	1,111,149	1,192,848	1,313,568	1,237,578
Oklahoma	271,078	286,697	285,643	323,528
Oregon	132,565	95,717	140,619	101,161
Pennsylvania	1,303,841	1,467,886	1,437,571	1,559,510
Porto Rico	.....	2,800	.....	7,702
Rhode Island	81,651	72,067	68,980	73,134
South Carolina	174,819	†126,369	149,917	140,609
South Dakota	81,989	64,846	61,429	61,786
Tennessee	231,638	†349,140	288,860	452,694
Texas	563,118	675,511	601,154	741,455
Utah	50,931	59,003	58,462	43,737
Vermont	67,482	130,517	64,211	145,097
Virginia	198,998	†187,160	183,762	194,236
Washington	342,740	244,546	361,159	263,893
West Virginia	126,545	153,996	151,406	194,527
Wisconsin	728,674	786,307	812,237	823,678
Wyoming	22,174	27,961	21,154	21,230
Unspecified	36,666	†13,536	2,209	991
	18,353,730	†18,879,216	19,841,130	20,239,188
Foreign countries	67,270	69,784	59,870	55,812
Total shipped from cement plants	18,421,000	†18,949,000	19,901,000	†20,295,000

*Includes estimated distribution of shipments from three plants in June and July, 1928, and in June, 1929; from four plants in July, 1929.
†Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN AUGUST, 1928 AND 1929, AND STOCKS IN JULY, 1929, IN BARRELS

District	Production 1928—August—1929		Shipments 1928—August—1929		Stocks at end of month 1928	1929	Stocks at end of July, 1929*
East'n Penn., N. J. and Md.	4,024,000	3,941,000	4,403,000	4,584,000	5,524,000	4,747,000	5,389,000
New York and Maine	1,320,000	1,449,000	1,519,000	1,747,000	1,423,000	1,467,000	1,765,000
Ohio, West'n Penn., W. Va.	2,047,000	2,190,000	2,687,000	2,431,000	2,447,000	3,194,000	3,435,000
Michigan	1,614,000	1,581,000	2,070,000	2,290,000	1,297,000	1,270,000	1,979,000
Wis., Ill., Ind. and Ky.	2,548,000	2,425,000	3,076,000	3,275,000	1,967,000	2,318,000	3,168,000
Va., Tenn., Ala., Ga., Fla., La.	1,508,000	1,450,000	1,699,000	1,644,000	1,676,000	1,624,000	1,818,000
East'n Mo., Ia., Minn., S.D.	1,901,000	1,578,000	2,372,000	2,589,000	2,073,000	2,081,000	3,092,000
West'n Mo., Neb., Kan., Okla.	1,181,000	1,430,000	1,312,000	1,773,000	1,222,000	926,000	1,269,000
Texas	519,000	707,000	623,000	786,000	257,000	466,000	546,000
Colo., Mont., Utah, Wyo., Ida.	290,000	357,000	364,000	368,000	382,000	518,000	529,000
California	1,288,000	1,128,000	1,294,000	1,123,000	746,000	997,000	991,000
Oregon and Washington	519,000	358,000	551,000	409,000	360,000	493,000	544,000
	18,759,000	18,594,000	21,970,000	23,019,000	19,374,000	20,101,000	24,525,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1928 AND 1929, IN BARRELS

Month	1928—Production—1929		1928—Shipments—1929		Stocks at end of month 1928	1929
January	9,768,000	9,881,000	6,541,000	5,707,000	25,116,000	26,797,000
February	8,797,000	8,522,000	6,563,000	5,448,000	27,349,000	29,870,000
March	10,223,000	9,969,000	10,135,000	10,113,000	27,445,000	29,724,000
April	13,468,000	13,750,000	13,307,000	13,325,000	27,627,000	30,151,000
May	17,308,000	16,151,000	18,986,000	16,706,000	25,984,000	*29,624,000
June	17,497,000	*16,803,000	18,421,000	18,949,000	25,029,000	*27,457,000
July	17,474,000	*17,281,000	19,901,000	*20,295,000	22,580,000	*24,525,000
August	18,759,000	18,594,000	21,970,000	23,019,000	19,374,000	20,101,000
September	17,884,000		20,460,000		16,799,000	
October	17,533,000		19,836,000		14,579,000	
November	15,068,000		11,951,000		17,769,000	
December	12,189,000		7,384,000		22,650,000	
	175,968,000		175,455,000			

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN AUGUST, 1928 AND 1929, IN BARRELS

District	Production 1928	1929	Stocks at end of month 1928	1929
Eastern Pennsylvania, New Jersey and Maryland	3,680,000	3,544,000	1,561,000	1,653,000
New York and Maine	1,146,000	1,114,000	799,000	704,000
Ohio, Western Pennsylvania and West Virginia	1,632,000	1,748,000	1,284,000	875,000
Michigan	1,305,000	1,339,000	1,057,000	804,000
Wisconsin, Illinois, Indiana and Kentucky	2,014,000	1,788,000	631,000	967,000
Virginia, Tenn., Alabama, Georgia, Florida and Louisiana	1,375,000	1,240,000	848,000	818,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,694,000	1,385,000	626,000	667,000
Western Missouri, Nebraska, Kansas and Oklahoma	1,089,000	1,209,000	496,000	408,000
Texas	539,000	770,000	128,000	259,000
Colorado, Montana, Utah, Wyoming and Idaho	220,000	263,000	303,000	364,000
California	1,106,000	1,121,000	1,193,000	1,005,000
Oregon and Washington	402,000	308,000	431,000	467,000
	16,202,000	15,829,000	9,357,000	8,991,000

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN JULY, 1929

Imported from	District into which imported	Barrels	Value
Belgium	Galveston	1,000	$1,162
	Los Angeles	46,086	25,882
	Massachusetts	29,073	35,013
	New Orleans	3,475	4,542
	New York	25,124	29,427
	Oregon	4,657	5,746
	Rhode Island	15,000	18,343
	San Antonio	6,000	7,073
	Total	130,415	$127,188
Cnaada	Maine & N. H.	40	$129
Denmark	New York	9,047	$9,497
	Porto Rico	13,000	17,266
	Total	22,047	$26,763
France	Florida	583	$1,632
	New York	125	254
	Total	708	$1,886
Germany	Los Angeles	3,000	$5,530
	San Francisco	123	240
	Total	3,123	$5,770
United K'gd'm	Los Angeles	500	$809
	New York	20,250	31,485
	Philadelphia	1,998	2,650
	Virginia	3,017	3,280
	Total	25,765	$38,224
	Grand total	182,098	$199,960

Exports and Imports

(Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.)

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN JULY, 1929

Exported to	Barrels	Value
Canada	7,522	$ 29,092
Central America	17,207	36,058
Cuba	4,625	13,302
Other West Indies and Bermuda	3,243	7,894
Mexico	14,860	45,753
South America	18,907	80,653
Other countres	5,628	34,425
	71,992	$247,177

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN JULY, 1929

	Barrels	Value
Alaska	3,406	$10,233
Hawaii	23,944	58,166
Porto Rico	2,000	4,560
	29,350	$72,959

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1928 AND 1929

Month	1928—Exports—1929 Barrels	Value	Barrels	Value	1928—Imports—1929 Barrels	Value	Barrels	Value
January	56,400	$204,875	78,639	$283,002	236,771	$315,797	151,302	$177,976
February	62,828	221,620	58,886	225,590	164,408	217,525	118,930	123,123
March	74,983	265,719	69,079	235,164	235,930	330,074	131,909	112,788
April	61,676	205,882	64,145	218,316	249,458	324,371	89,668	114,281
May	70,173	236,005	57,955	219,366	190,509	256,872	200,646	267,854
June	59,536	201,313	96,055	287,612	266,537	359,637	203,545	228,170
July	83,759	291,055	71,992	247,177	112,887	151,877	182,098	199,960
August	88,736	302,866	.....	.....	259,975	358,471	.....	.....
September	71,995	252,843	.....	.....	173,439	226,295	.....	.....
October	62,137	246,010	.....	.....	152,210	226,909	.....	.....
November	69,313	260,310	.....	.....	65,969	89,732	.....	.....
December	63,120	250,204	.....	.....	175,992	233,300	.....	.....
	824,656	$2,938,702	.....	.....	2,284,085	$3,090,860	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1928 AND 1929, IN BARRELS

Month	1928—Production—1929		Stocks at end of month 1928	1929	Month	1928—Production—1929		Stocks at end of month 1928	1929
January	11,839,000	12,041,000	9,672,000	9,642,000	July	15,981,000	†15,180,000	11,707,000	†11,619,000
February	11,363,000	11,255,000	12,237,000	12,436,000	August	16,202,000	15,829,000	9,357,000	8,991,000
March	12,501,000	12,450,000	14,463,000	14,948,000	September	15,909,000	.....	7,566,000	.....
April	13,844,000	14,166,000	15,002,000	15,472,000	October	15,782,000	.....	5,944,000	.....
May	16,025,000	15,445,000	14,329,000	14,911,000	November	14,930,000	.....	5,953,000	.....
June	15,940,000	15,312,000	12,944,000	†13,586,000	December	13,426,000	.....	7,422,000	.....

†Revised.

*The inclusion of Wyoming begins with April, 1929; of Idaho, with June, 1929.

Huge Overcapacity in American Portland Cement Mills

AMERICAN portland cement mills are still operating at only about two-thirds capacity, according to William M. Kinney, general manager of the Portland Cement Association, Chicago.

Taking into consideration the production for the past year, based on statistics recently released by the Bureau of Mines and the Department of Commerce, the ratio of operations to capacity of the cement mills for the last 12 months was 68.2%. The highest ratio for 1929 was 71% which was registered during January. The ratio percentage since May has been under 70%, according to the monthly Bureau of Mines Survey, falling to 68.2% in August.

Hill Company Opens New Sand and Gravel Plant

THE new plant of the Hill Sand and Gravel Co., recently opened at New Westminster, B. C., is now producing about 150 cu. yd. of sand and gravel daily. Truck deliveries are made to the outlying district and the metropolis.

The company owns a 10-acre deposit which on prospecting has revealed a good grade of sand and gravel to a depth of 200 ft.—*New Westminster* (B. C.) *Columbian.*

Proceedings of 1929 Meeting, American Concrete Institute

THE PROCEEDINGS of the 25th annual convention of the American Concrete Institute, held at Detroit in February, 1929, have been published in one bound volume of 880 pages. All papers delivered at the meeting have been included, as well as many interesting diagrams and pictures to illustrate the text. The reports of the various committees are given in full detail and also any discussion following these reports on convention papers.

First Cement Unloaded at Marquette's Memphis Storage Plant

PART of the Marquette Cement Manufacturing Co.'s new Memphis, Tenn., plant, at the foot of Keel Avenue, began operating recently when pneumatic pumps started to unload the 800 tons of cement brought in a barge towed by the steamer *El Capitan*.

It was the first cargo of bulk cement ever transported by river to this port. On board the steamer were Richard Moyle, Sr., general superintendent of the cement company at LaSalle, Ill.; W. A. Wecker, secretary and treasurer; H. O. Cole, general superintendent of the company's plant at Cape Girardeau; L. W. Saxby, purchasing representative of LaSalle, Ill.; J. E. Hagan, chief engineer of the Cape Girardeau plant, and Frank Baumgardner, chief engineer of the plant at LaSalle.

The "El Capitan" towed the first cargo of bulk cement transported by river to Memphis, Tenn.

After the cement is unloaded into the company's storage bins at Memphis, it will be sacked and made ready for shipment. The territory south of Memphis and to the southeast and southwest, will be supplied from the local plant, it was announced.—*Memphis* (Tenn.) *Commercial-Appeal.*

The four special steel barges for this traffic were built by the Riter-Conley Co., Pittsburgh, Penn., after plans by T. R. Tarn, naval architect, Pittsburgh.

All of the barges are 175 ft. long by 35 ft. wide by 8 ft. deep, are equipped with screw conveyors beneath the hopper-bottom bins that carry the cement. These conveyors feed the cement to a Fuller-Kinyon pump which draws the cement up through a 5-in. pipeline that runs the length of the deck at the two unloading terminals and up to the top of the storage silos. A flexible connection joins the barge pipe with the one on the dock.

Iowa Countryside Excited Over Limestone Explorations

CAPITALISTS from Dayton, Ohio, were in Charles City, Iowa, recently and had a crew of men drilling on the M. L. Troutner farm at Floyd. They have entered into a contract with Mr. Troutner for purchase of the land if it develops that it contains the right kind of material that can be used in the making of cement. If this is forthcoming, the erection of a large cement plant, to be located between here and Minnesota, will be built.

The men who are conducting drilling operations near Floyd are believed to be the same men who were in Osage a few weeks ago, drilling on land southwest of town. While here they received a good deal of attention, and people wondered whether Osage was to get a cement plant or some other limestone industry.

R. E. Hoffman and Leslie L. Fowler, of Hannibal, Mo., are the men who were here. Their employer is S. B. Kelly of Dayton, Ohio. Mr. Kelly denied at the time he had had any intention of starting a cement plant. All he wanted, he stated, is high grade limestone, but he wouldn't tell why he wanted it.

The men left Osage for Le Roy, Minn., where they conducted drilling operations. People in that community became as excited as Osagers had been, and dreamed of a cement plant. The drillers soon completed their testing there, and went to Floyd, where they are now.

It is quite evident that the men aren't spending hundreds of dollars in drilling operations without some definite purpose in view. Some contend they are scouts for a large cement company; and that they are simply seeking to get a line on limestone deposits in this part of the state, so that when their present sources of supply run out, they will know where to get plenty of material.

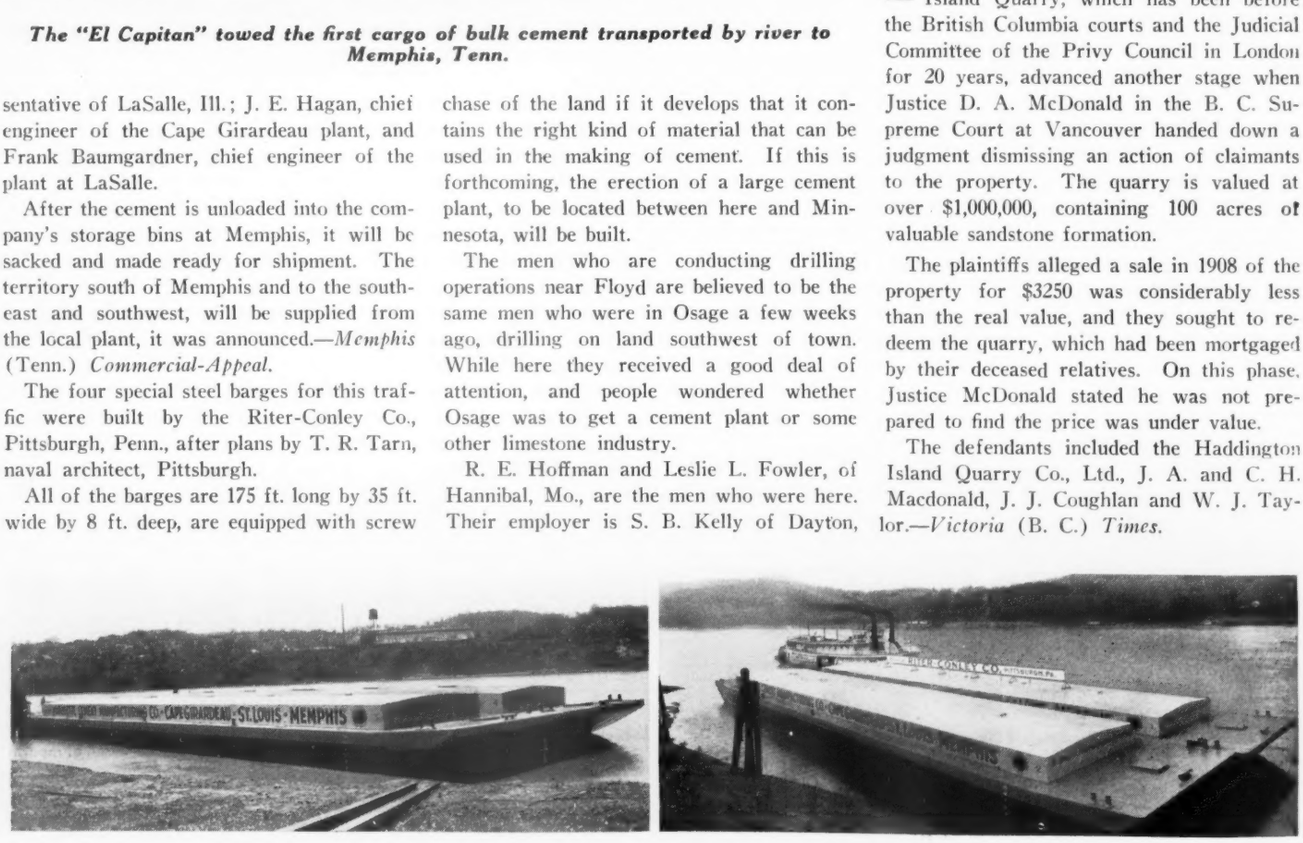
Rumors that the men have connections with large cement companies are given credence here. On the other hand, they may be freelance prospectors, who are attempting to locate limestone deposits, buy them, and then sell them at a large profit to cement interests.—*Osage* (Iowa) *News.*

Haddington Island Quarry Case Dismissed

LITIGATION involving the Haddington Island Quarry, which has been before the British Columbia courts and the Judicial Committee of the Privy Council in London for 20 years, advanced another stage when Justice D. A. McDonald in the B. C. Supreme Court at Vancouver handed down a judgment dismissing an action of claimants to the property. The quarry is valued at over $1,000,000, containing 100 acres of valuable sandstone formation.

The plaintiffs alleged a sale in 1908 of the property for $3250 was considerably less than the real value, and they sought to redeem the quarry, which had been mortgaged by their deceased relatives. On this phase, Justice McDonald stated he was not prepared to find the price was under value.

The defendants included the Haddington Island Quarry Co., Ltd., J. A. and C. H. Macdonald, J. J. Coughlan and W. J. Taylor.—*Victoria* (B. C.) *Times.*



Special steel barges for carrying bulk cement from the Marquette Cement Manufacturing Co.'s mill at Cape Girardeau, Mo., to its new distributing storage plant at Memphis, Tenn.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

An Industrial Cement Products Plant for an Industrial City

JUST SOUTH AND EAST of Chicago, extending across the Indiana state line, lies the Calumet district, centering around the city of Hammond. A number of large firms have established manufacturing plants there because of its closeness to middle western markets and its rail and water transportation facilities. It has become a great industrial territory, with many large factories, steel mills, oil refineries and all the allied activities of mass production.

Concrete masonry is being widely used in erecting these factories and the homes of their thousands of employes. The Hammond Concrete Block Works, one of the outstanding products plants supplying this market, has applied the efficient production methods, used in these factories, to the manufacture of concrete building units. It is an interesting example of a concrete products plant laid out on industrial lines to serve an industrial community.

The plant layout of the Hammond Concrete Block Works has three specific features that make for efficiency and low-production costs. First, as many operations as possible are handled by machinery, thus keeping the labor requirements at a minimum. Second, the equipment is simple, economical and practical. Third, the plant and equipment is designed for volume production. All of these features have been carefully planned by Jake Golden, owner and manager, who has been in the concrete products business since 1903 and who is applying the knowledge gained in his 26 years' experience to meeting modern market demands for concrete masonry.

A glance at the flow sheet of the plant shows how these features result in efficiency and hence in production economies. The aggregates are delivered in carload quantities on the plant's sidetrack and are emptied directly into a receiving hopper beneath the track, from where drag chains draw them to a vertical bucket elevator inside the building.

Two large concrete-stave storage silos with a capacity of seven carloads each provide space for reserve materials. These were built at a time when it was necessary to provide against car shortages and are not used at present except under unusual market conditions. The common practice is to lift the aggregates to the two small overhead metal bins, having a capacity of approximately 20 cu. yd. each, from which the batch quantities are measured directly into the mixers. In this way the material passes continuously from the freight car to the mixers without rehandling. With one block machine in operation, a car of aggregate is made up into units in two days, so that there are no demurrage charges on the car.

The Hammond Concrete Block Works at Hammond, Ind., showing the storage silos and elevator pent house and the well arranged stock piles in the yard

Cement by Truck in Bulk

One of the most interesting things about this plant is the way in which the cement is handled. Hammond lies within trucking distance of a cement mill. Mr. Golden has designed a truck for transporting cement in bulk, saving the handling of sacked cement and the empty sacks after the cement has been used.

The truck body is a flattened tank, tapered at the rear end. It is filled through a porthole on top. When dumped, the front end is elevated and the tapered rear end forms a funnel through which the cement runs out. The truck is driven under the bulk cement storage bins at the cement mill, filled and driven back to the products plant, where it is spotted over the receiving hopper of a horizontal screw conveyor just outside the building. A metal spout is connected from the discharge port at the rear end of the truck body to the receiving hopper, thus preventing any loss of cement by wind.

The horizontal screw conveyor runs beneath the floor of the plant and carries the cement to a vertical bucket elevator inside the building, which lifts it to a small overhead bin above the mixing platform.

One of the important things in the design of the truck was to prevent the cement from packing down in transit so that it would not run out when the body was elevated. This difficulty has been met by designing a system of pipes on the floor of the body which is connected

with an air compressor driven by the truck's motor. Holes, ⅛-in. in diameter, spaced about 6 in. apart along the length of the pipes, allow air to be blown into the bulk cement, thus making it a simple matter to run the cement from the tank into the receiving hopper.

The materials are measured in batch quantities from the overhead bins into the mixers. The mixing floor is located under the bins and over the two block machines. There are two batch mixers, one for each machine, each having a capacity of 14 cu. ft. The mixers empty directly into hoppers on the block machines, where the concrete is molded into finished units. In this way both cement and aggregates are passed from the delivery point at the plant to the finished units entirely by machinery, without being handled by man-labor. This straight-line production is achieved without excessive investment in mechanical equipment and results in very definite economies.

The two hydraulic-pressure block machines continue the elimination of manpower, since every operation is automatic, from feeding the pallets to stripping the units. Each machine produces four units per minute, requiring only one man as offbearer. The offbearer has only to lift the finished units from the machine to a curing rack at his side without taking any steps.

The curing racks are handled by a gasoline power lift truck, which places the racks in the curing room and from there transports them on a concrete pavement to the outdoor storage yard. The operator of the lift truck returns the pallets and spots the empty racks for the offbearers.

The labor requirements for the two-machine plant are as follows: One man on the mixer platform operates both mixers and at the same time tends to the elevators for cement and aggregates. One man on each machine offbears the units. One man on the lift truck transports the storage racks and returns the pallets. One man piles the units in the storage yard and assists the truck drivers in loading out for deliveries. The plant superintendent oversees the machines, attends to the oiling and acts as relief offbearer. Thus the total labor requirement for operating two machines is six men. Four of this number are laborers and two are trained, experienced workmen. It may be readily seen that the labor requirements are at an efficient minimum.

One of the two automatic block machines that produces four units per minute—cement elevator at the left

The power lift truck with a load of 5 x 8 x 12 concrete tile for piling into storage yard. Note the concrete pavement

The average production per machine for a nine-hour day is 1700 standard 8x8x16-in. units. This allows time for clean-up and occasional shut-down, and represents the actual production under practical conditions. The total labor cost, from handling the raw materials until the finished block are piled in the storage yard, is approximately 1.2 c. per unit.

Another desirable feature of this plant is its flexibility. In the rush season, when deliveries are at their peak, it is easy to hire additional help in the curing room and storage yards. Then, during the dull season, the day labor may be laid off and the plant operated by the experienced men without excessive overhead costs for maintaining the plant force. Furthermore, a plant of this kind, where only two skilled operators, the mixer man and the superintendent, are needed is readily adaptable to multiple shift operation because of the small number of experienced men required.

Three types of units are in demand in this market: The 8x12x16-in. block are extensively used for heavy load bearing walls in factory and store structures. The 8x8x16-in. block are used for foundations and above grade walls in residences, and the 5x8x12-in. concrete tile have a wide use for backup and partition walls. The plant's production is approximately equally divided among these three sizes of units.

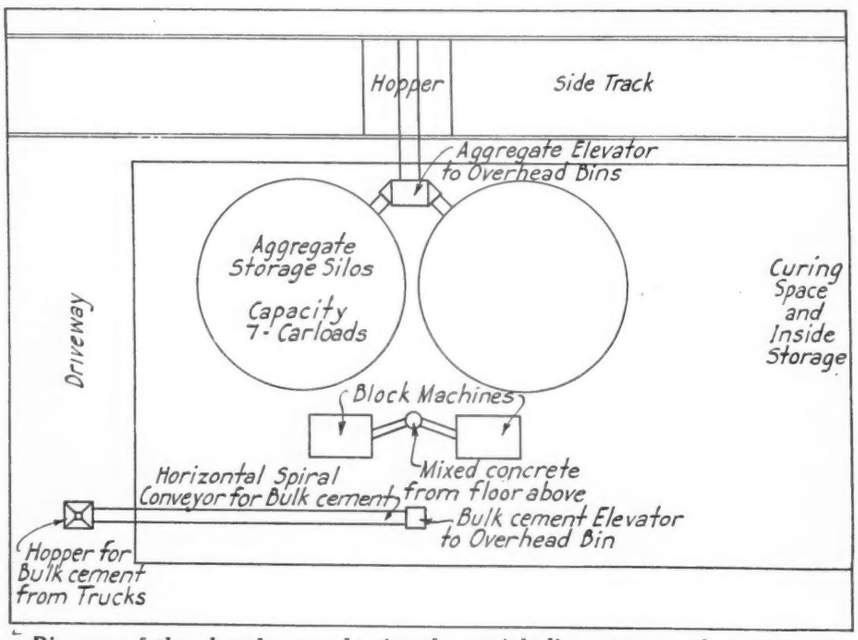


Diagram of the plant layout, showing the straight-line progress of cement and aggregates through the plant to the finished units

Feldspar Grinders' Institute Holds First Convention

THE FIRST general meeting or convention of the Feldspar Grinders' Institute, Inc., which was officially organized July 15, 1929, was held at Atlantic City, N. J., September 20 and 21. The business of the meeting consisted largely in hearing and acting upon the reports of the following standing committees:

Classification and Standards Committee.

Tariff Committee in Cooperation With Ceramic Industry.

Transportation Committee.

Truck Delivery Committee.

Package Committee.

Cost Accounting Committee.

Code of Ethics Committee.

Officers

The officers and directors of the Institute are:

President: Richard Wainford, Trenton, Flint and Spar Co., Trenton, N. J.
Vice-President: H. P. Margerum, Consolidated Feldspar Corp., Trenton, N. J.
Vice-President: C. H. Peddrick, Jr., United Feldspar Corp., 10 East 40th street, New York City.
Secretary-Treasurer: L. L. Hunt, Bedford Mining Co., Bedford, N. Y.
Commissioner: W. J. Parker, 7 East 44th street, New York City.
Director: Norman G. Smith, Maine Feldspar Co., Brunswick, Me.
Director: H. G. McLear, Green Hill Mining Co., 141 Broadway, New York City.

Members

Bedford Mining Co., Inc., Bedford, N. Y.
Dominion Feldspar Corp., Rochester, N. Y.
Erwin Feldspar Corp., Erwin, Tenn.
Golding Sons Co., Trenton, N. J.
Maine Feldspar Co., Brunswick, Me.
New York Feldspar Co., Lewistown, Penn.
Golding Keene Co., Keene, N. H.
Green Hill Mining Co., 141 Broadway, New York City.
Rock Products Co., Silica, Ohio.
Standard Flint and Spar Corp., Trenton, N. J.
Trenton Flint and Spar Co., Trenton, N. J.
United States Feldspar Corp., Cranberry Creek, N. Y.
Oxford Mining and Milling Co., West Paris, Maine.
Tennessee Mineral Products Corp., Spruce Pine, N. C.

This membership list is said to include 90-odd per cent. of the total production of feldspar in the eastern half of the United States.

Development of the Feldspar Industry

For years during the early development of the felspar industry the kilns of the ceramic manufacturers were practically the only means of study and research which the feldspar producers had.

The manufacturer used the kind of feldspar that someone thought or guessed was proper and trusted to luck and the judgment of the guesser for his results. If that particular feldspar contained the correct chemical constituents, the manufacturer did his best to secure more of a similar makeup, but his efforts for the most part would be in vain more often than they were rewarded, for at that time even the feldspar producer himself could only guess that the second shipment would be the same as the first.

The expense and waste of this very unsystematic procedure was enormous. Something surely had to be done towards its elimination. Chemists were employed by the producers and the equipment of laboratories was started. The beginning of a new era dawned on the whole feldspar industry and facts started taking the place of guesswork.

Through recent years this systematic study of feldspar has progressed to a thoroughly scientific stage of research until today part of the industry plays so important role as the modern well equipped testing laboratory.

Deposits of feldspar are now analyzed before they are mined and a complete record is kept of their location, quality and quantity.

The formula of any ceramic manufacturer can now be adhered to year in and year out with the assurance that he can at any time get like feldspar in successive shipments.

It is quite natural that there are obstacles still to be overcome in the feldspar industry, but those already overcome have been of no less magnitude. Many of the present obstacles which might possibly have a tendency to retard progress and expansion can be best eliminated by the users of feldspar themselves, although the responsibility of providing the means to this end very rightfully falls upon the shoulders of the feldspar producers. With this fact in mind the producers are continually striving to give the consuming ceramic industry all possible knowledge of the methods of using feldspar, with the belief that the future of the industry will develop more or less in direct proportion to the knowledge they are able to impart.

The first producers of American clays had very nearly the same problem in bringing about an understanding of the intelligent use of their products. The first pottery company were more thoroughly familiar with imported clays than domestic and it required no little educational effort before the earlier potteries, etc., learned the correct use of the different clays and their relationship to each other.

Such has been the case with feldspar, and many cases of improper results have been credited to a poor quality of feldspar where, after a study of the situation was made, it was found that the feldspar was of good quality but not of the right analysis for that particular product and manufacturer.

Rogers Sand Co. Sold to McCrady Bros. Co.

ACCORDING to a report in the *Pittsburgh* (Penn.) *Sun*, McCrady Brothers Co. will take over the assets of the Rogers Sand Co. of Pittsburgh within a short time. An agreement providing for the transfer of the physical assets of the sand company and the liquidation of the organization has been reached, although the officials of the two organizations have not yet made a formal announcement of the merger.

McCrady Brothers Co. are among the largest contractors, builders and dealers in builders' supplies in the Pittsburgh district. The Rogers Sand Co. is understood to have plants, properties and river fleets with a value of about $1,900,000.

The details of the financing of the merger have not yet been fully completed. It is quite likely that changes will be made in the capital structure of the McCrady Brothers Co. to provide for the purchase.

McCrady Brothers are understood to have held an interest in the Rogers company for a considerable period of time. They are also reputed to be the largest customer of the Rogers company. The consolidation will insure an outlet for a large share of the Rogers output as well as strengthening the McCrady connection with its source of supply.

It is understood that the combined companies will have assets of over $4,500,000 and will have a dominant position in the building supply field here.

The dock facilities owned by the Rogers Sand Co. will be particularly valuable to McCrady company in the handling of their distribution of materials to all parts of the city. The McCrady organization has been developing the use of transit-mixed concrete and the large number of docks will be an asset for this type of business.

James H. McCrady of the McCrady Brothers Co. is also president of the American Gypsum Co., Port Clinton, Ohio.

New Company Formed to Build Lime and Hydrate Plants

A NEW company, Lime and Hydrate Plants, Inc., with offices at the Weiser building, York, Penn., has been organized by William J. Kuntz, formerly connected with the McGann Manufacturing Co., York, Penn. The building of modern lime and hydrate plants will be engaged in and for the present its specialties will be manufactured in local or other shops.

A $150,000 contract, according to the company, has been received for the erection of a 100-ton gas-fired lime plant at Moosetown, Can., for the Winnipeg Supply and Fuel Co. C. C. Jones, formerly of the McGann company is associated with Mr. Kuntz as chief construction engineer.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Bound Brook, N. J.	1.35	2.10	1.90	1.50	1.50	.....
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Md.	.50– .75	1.35–1.45	1.15–1.25	1.10–1.20	1.05–1.15	1.05–1.10
Ft. Spring, W. Va.	.35	1.25	1.25	1.25	1.15	1.10
Munns, N. Y.	.75	1.00	1.00	1.00	.....	.....
Prospect, N. Y.	.80	1.00	1.00	1.15u	1.15u	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.65	1.25	1.05	.95	.85	1.00
Shaw's Junction, Penn. (e)	.85	1.35–1.60	1.35	1.35	1.35	1.35
Syracuse, N. Y.	.50	1.00	1.00	1.00	1.00	1.00
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.50	.....	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Cape Girardeau, Mo.	1.00	1.10	1.25	1.25	1.00	.....
Columbia and Krause, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Cypress, Ill.	1.60	1.00	1.10	1.00	1.00	1.25
Davenport, Iowa (f)	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.95	1.10	1.20	1.10	1.10	1.10
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05 1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.00	1.00	1.00	1.00
Lannon, Wis.	.90	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Northern Ohio points	.85–1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.10	1.00	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.10	1.70	1.70	1.70	1.70	1.70
Toronto, Canada	2.50	2.50	2.50	2.50	2.50	2.50
Valmeyer, Ill. (fluxing limestone)	.90–1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.90	.....	.90	.90	.90	.90
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	1.00	1.00	1.25	1.25	1.25	1.25
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.35	1.15	1.15
Chico, Texas	.50	1.30	1.30	1.25	1.20	.....
Cutler, Fl.	.....	.50– .75r	.....	1.50–1.75r	.....	1.10r
El Paso, Texas (r)	.75–1.00	1.00–1.25	1.00–1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run, screened, $1 per ton					
Olive Hill, Ky.	.....	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Chico, Texas	2.50	2.00	1.45	1.20	1.15	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.25	1.25	1.25
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35–1.40	2.10	1.80–1.90	1.40–1.50	1.40–1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25
Springfield, N. J.	1.40	2.00	1.90	1.60	1.60	.....
Toronto, Canada	.....	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	.....	.....	2.25–2.50s	.....	.....	.....
Lithonia, Ga.—Granite	.60	2.00b	1.75	1.35	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)	.....	.....	1.50 to 1.85	.....	.....	.....
Toccoa, Ga.—Granite	1.50	.....	1.50	1.35	1.30	1.25

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) High calcite fluxing limestone, 92–98% CaCO, 1.75. (g) Run of quarry. (h) Less 10c discount. (j) Less 10% net ton. (k) Rubble stone. (l) Less .05. (n) Ballast R. R., .90; run of crusher, 1.00. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yard. (s) 1-in. and less, per cubic yard. (t) Rip rap, 1.20–1.40 per ton. (u) Less 2%.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; .03% $MgCO_3$; 90% thru 100 mesh	5.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, 45% thru 200 mesh	a5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.—90% thru 100 mesh, 2.00; 50% thru 50 mesh	1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 94-98% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.05; 90% thru 4 mesh, 1.10; 50% thru 4 mesh	1.00
Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk	3.50
Paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25 cash 15 days)	
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton	6.00
90% thru 20 mesh, bulk, per ton	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk	2.50
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl — Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35–1.60
Olive Hill, Ky.—Analysis, $CaCO_3$ 94-98%; 90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 101.12%; 60% thru 100 mesh	2.50
100% thru 10, 90% thru 50, 70% thru 100: bags, 5.00; bulk	3.50
100% thru 4, 30% thru 100, bulk	1.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Sibley, Mich.—Analysis, 87.47% $CaCO_3$; 8.30% $MgCO_3$; 60% thru 100 mesh, bulk, per ton, 2.30; 100-lb. paper bags, f.o.b. Sibley, Mich., per ton	3.75
Watertown, N. Y.—Analysis, 53.72% $CaCO_3$; pulverized; sacks, 4.25; bulk	2.75

(a) Less 50c comm. to dealers per ton.

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1% $MgCO_3$; 90% thru 10 mesh	1.50
30% thru 100 mesh	1.50

(Continued on next page)

Agricultural Limestone

Cape Girardeau, Mo.—Analysis, 94½% $CaCO_3$, 3½% $MgCO_3$; 50% thru 50 mesh 1.50

Chico and Bridgeport, Tex. — Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00–1.25

Charles-Town, W. Va.—Lime Marl—Analysis, 95% $CaCO_3$, 50% thru 100 mesh, bulk, 3.00; including burlap bags 4.50

Colton, Calif.—100% thru 16 mesh, bulk, 4.00; including sacks 5.00

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton 1.25

90% thru 4 mesh, per ton 1.10

Dubuque, Ia.—Analysis, 34.96% $CaCO_3$; 59.62% $MgCO_3$; 90% thru 50 mesh ..... .95

Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00

Ft. Spring, W. Va. — Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh 1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00

Kansas City, Mo.—50% thru 100 mesh 1.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00

Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh 3.00

90% thru 50 mesh 2.00

90% thru 4 mesh 1.00

McCook, Ill.—90% thru 4 mesh ..... .95

Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Kokomo, Ind. —85% thru 10 mesh, 25% thru 100 mesh 1.50

Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags 5.00

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

West Stockbridge, Mass.—Analysis, 95% $CaCO_3$; 50% thru 50 mesh, bulk 3.50

100 lb. paper bags, 4.25*; cloth 5.25

Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh 2.10

Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.10–1.70

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks 6.00

Hillsville, Penn., sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra) 3.50

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks 4.25

Piqua, Ohio—99% thru 100 mesh, bulk, 3.50; in 80-lb. bags (f.o.b. Piqua) 5.00

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Shaw's Junction, Penn.—Analysis, 91.55% $CaCO_3$; 96% $MgCO_3$; 70% thru 100 mesh, bulk 4.50

Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J. *1.75–2.25

Cheshire, Mass., in carload lots 5.00–7.00

Estill Springs and Sewanee, Tenn. 1.50

Franklin, Penn. 2.00

Klondike, Mo. 2.00

Massillon, Ohio 3.00

Michigan City, Ind. ..... .30– .35

Ohlton, Ohio 2.50

Ottawa, Ill. 1.25

Red Wing, Minn. 1.50

San Francisco, Calif. 4.00–5.00

Silica and Mendota, Va. 2.00–3.00

St. Louis, Mo. 2.00

Utica and Ottawa, Ill. 75–1.00

Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	.....	1.50
Dresden, Ohio	.....	1.25
Eau Claire, Wis.	4.30	.60–1.00
Estill Springs and Sewanee, Tenn.	1.35–1.50	1.35–1.50
Franklin, Penn.	.....	1.75
Massillon, Ohio	.....	2.00
Michigan City, Ind.	.....	.30

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.50	.50	1.15	1.25	1.25	.....
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25	.....	2.25	2.25
Buffalo, N. Y.	1.00	1.05	1.05	.....	.....	.....
Erie, Penn.	.70	.90	1.30	1.30	.....	.....
Leeds Junction, Me.	.....	.50	1.75a	.....	1.25	1.00c
Machias Jct., N. Y.	.75	.75	.75	.....	.75	.75
Milton, N. H.	.....	.50	.....	.....	.....	.90
Montoursville, Penn.	1.00	.70	.60	.60	.50	.50
Morrisville, Penn.	.50	.40	.90	1.00	1.00	.....
Northern New Jersey	.50	.50	.....	1.25	1.25	.....
South Portland, Me.	.....	1.00	2.25	.....	.....	2.00
Troy, N. Y.	.50– .75*	.50– .75*	.80–1.00*	.80–1.00*	.....	.80–1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75	.....	1.75
Washington, D. C.	.60	.60	1.20	1.20	1.00	1.00
Georgetown, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.50	.35	.25	.45	.45	.50
Appleton, Minn.	.....	.50	1.25	.....	1.50	.....
Attica, Ind.			All sizes .75–.85			
Barton, Wis.	.....	.40s	.50s	.65s	.65s	.65s
Chicago, Ill.	.50	.50–1.45n	.60	.60–1.55n	.60	.60–1.90r
Des Moines, Iowa	.60	.60	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.	.....	.40	.55	.95	.85	.....
Elkhart Lake and Glenbeulah, Wis.	.30	.30	.50	.50	.50	.50
Grand Haven, Mich.	.....	.60	.....	.90	.....	.90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio	.....	.85	.85	.....	.85	.....
Hersey, Mich.	.....	.50	.....	.60	.70	.70
Humboldt, Iowa	.50	.50	1.40	1.40	1.40	1.40
Indianapolis, Ind.	.50– .75	.40– .60	.50– .75	.50– .75	.60– .85	.60– .85
Mankato, Minn. (h)	.55	.45	.....	.....	1.25	.....
Mason City, Iowa	.....	.60	.85	1.25	1.25	1.25
Mattoon, Ill.			.75–.85 all sizes			
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn. (g)	.35	.35	1.35	1.35	1.35	1.25
St. Louis, Mo. (b)	1.30e	1.30f	1.55t	1.55	1.55	1.65
St. Louis, Mo.†	2.00e	2.00f	2.25t	2.25	2.25	2.35
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.10	1.25
SOUTHERN:						
Brewster, Fla.	.50	.50	.....	.....	.....	.....
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.	.....	.45– .50	.....	.....	.....	.....
Fort Worth, Texas	.75	.85–1.00	1.00–1.10	1.00–1.10	1.00–1.10	1.00–1.10
Gainesville, Texas	.....	.....	.....	.....	.55	.....
Knoxville, Tenn.	.85	.85	1.50	1.20	1.20	1.20
Macon, Ga.	.65– .90	.65– .90	2.25–2.50	2.25–2.50	2.25–2.50	2.25–2.50
New Martinsville, W. Va.	1.10	1.00	.....	1.30	1.10	.90
Roseland, La.	.30	.30	1.00	.80	.80	.80
WESTERN:						
Kansas City, Mo.	.70– .80	.70– .75	.....	.....	.....	.....
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10– .40	.10– .40	.50–1.00	.50–1.00	.50–1.00	.50–1.00
Los Angeles, Calif.	.10– .40	.10– .40	.20– .90	.50– .90	.50– .90	.50– .90
Oregon City, Ore.			All grades range from 1.00 to 1.50 per cu. yd.			
Otay, Calif.	.....	.35– .40	.50– .60	.50– .60	.50– .60	.50– .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60	.....	1.25	.....	1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.	.....	.....	.40	.....	.....	.....
Appleton, Minn.	.55	.....	.....	.....	.....	.....
Brookhaven, Miss.	.....	.....	.....	.....	.....	.60
Buffalo, N. Y.	1.10	.95	.....	.85	.....	.35
Burnside, Conn.	.75*	.....	.....	.....	.....	.....
Chicago, Ill.	1.25m	.....	.....	.35	.....	.....
Des Moines, Iowa	.....	.....	.....	.85	.....	.....
Dresden, Ohio	.....	.....	.....	.70	.65	.....
Eau Claire, Chippewa Falls, Wis.	.....	.....	.....	.....	.65	.....
Fort Worth, Texas	.....	.....	.....	.....	.....	.67– .75
Gainesville, Tex.	.....	.....	.....	.....	.55	.....
Grand Rapids, Mich.	.....	.....	.....	.50	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hersey, Mich.	.....	.....	.....	.50	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35	.....	.....	.....	.....	.....
Mankato, Minn.	.70	.....	.....	.....	.....	.....
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.	.....	.....	.....	.60	.60	.60
Steilacoom, Wash.	.25	.25	.25	.25	.25	.25
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.....	.....	.....	.....	.....	.60
York, Penn.	1.10	1.00	.....	.....	.....	.....

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) 1½- to ¼-in., 1.65. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Per yd., del. by truck, ¼-in. down, 1.25; 2 in. and less, 2.40. (h) ¼- to ¾-in., 1.25. (j) Lake sand, 1.75, delivered. (k) 60–70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (r) Pit run. (s) Plus 15c for winter loading. (t) Fine and regular binder. (u) Coarse, torpedo, also roofing. (v) Coarse binder. †2% discount if paid by 15th of month following delivery.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25	.....	.....	3.75	.....
Beach City, Ohio	1.75	1.75	.....	1.50	1.50	.....	.....
Cheshire, Mass.	Sand for soap, 7.00–8.00					6.00–8.00	.....
Dresden, Ohio	1.25–1.50	1.25–1.50	1.50–1.75	1.00–1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.50–3.00	.....
Elco, Ill.	Ground silica, 92-99½% thru 325 mesh, 16.00–35.00 per ton						
Estill Springs and Sewanee, Tenn.	1.25	.....	.....	1.25	.....	1.35–1.50	.....
Franklin, Penn.	1.75	1.75	.....	1.75	.....	.....	.....
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Kerrs, Ohio	1.00–1.50	1.25–2.00	2.00	.....	.....	2.75–3.00	.....
Klondike, Mo.	2.00	.....	.....	2.00	2.00	.....	.....
Masillon, Ohio	2.25	2.25	.....	2.25	2.50	.....	.....
Michigan City, Ind.	.....	.....	.....	.30– .35	.....	.....	.....
Montoursville, Penn.	.....	.....	.....	1.35–1.50	.....	.....	.....
New Lexington, Ohio	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75	1.75	.....	2.00	1.75	1.75	.....
Ottawa, Ill.	1.25	1.25	1.25	1.25	1.25	3.50	3.00
Red Wing, Minn. (d)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50–5.00†	3.50–5.00†	3.50–5.00†	.....
Silica, Mendota, Va.	2.50	.....	.....	.....	2.50	.....	2.00
Utica and Ottawa, Ill.	.40–1.00f	.40–1.00f	.75–1.00	.40–1.00f	.60–1.00f	2.23–3.25	1.00–3.25
Warwick, Ohio	1.50*–2.00h	1.50*–2.00h	.....	1.50*–2.00h	.....	.....	.....
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00	.....	.....

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00–4.25. (f) Crude and dry. (g) Potters sand, 8.00–10.00–12.00; building sand, 1.75–2.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	.....	1.30*	.....	1.45*	.....	1.45*	.....
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	.....
Toledo, Ohio	1.50	1.10	1.25	1.25	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	.75	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., 90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	17.50	.....	2.00
Buffalo, N. Y.	.....	.....	.....	12.00	.....	.....	.....	.....
Lime Ridge, Penn.	.....	.....	.....	.....	.....	.....	5.00	.....
West Stockbridge, Mass.	12.00	10.00	5.60	.....	.....	.....	.....	2.00[13]
Williamsport, Penn.	10.00–11.00	8.50–9.00	8.50–9.00	.....	7.00	9.00	5.00	.....
York, Penn., & Oranda, Va.	11.50[7]	8.50–9.50[7]	8.50–9.50[7]	8.50–10.50[7]	8.00	9.25	7.00	1.40[4]
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.75	7.50	12.11
Carey, Ohio	11.50	7.50	7.50	.....	8.00	.....	7.50	1.50
Cold Springs, Ohio	.....	6.50	6.50	.....	.....	.....	.....	.....
Gibsonburg & Whiterock, O.	9.50	.....	6.50	.....	8.00	10.00	.....	.....
Huntington, Ind.	.....	6.50	6.50	.....	.....	.....	.....	.....
Luckey, Ohio	11.50	.....	.....	.....	.....	.....	.....	.....
Marblehead, Ohio	.....	6.50	6.50	.....	.....	.....	7.00	1.50[3]
Milltown, Ind.	.....	8.50–10.00	.....	10.00[8]	.....	.....	8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00[23]	7.50	1.50[16]
Scioto, Ohio	10.50	7.50	7.50	8.50	8.00	.62½	7.00	1.50
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	.....	9.50	2.00
Tiffin, Ohio	.....	.....	.....	.....	8.00	10.00	.....	.....
Wisconsin points[6]	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio[26]	9.50	6.50	6.50	10.50[24]	8.00	10.00[9]	8.00	1.40[3]
SOUTHERN:								
El Paso, Texas	.....	.....	.....	.....	.....	.....	7.00	1.50
Frederick, Md.	.....	8.00–9.50	8.00–9.50	.....	.....	9.50[15]	7.00[16]	.....
Graystone & Landmark, Ala.	12.50	9.00	.....	12.50	8.50	.....	7.50	1.35
Keystone, Ala.	17.00	9.00	9.00	8.00–12.00	.....	.....	6.00[21]	1.35
Knoxville, Tenn.	17.00	9.00	9.00	9.00	7.50	.62½	7.50	1.35
Ocala, Fla.	12.00	11.50	.....	.....	.....	.....	.....	1.40
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	15.00	14.00	12.00	18.00	.....	.....	13.50	.....
San Francisco, Calif.	19.50	15.00	13.00	15.00–19.00	14.50[20]	.90[17]	14.50[19]	1.85[17]
Tehachapi, Calif.[18]	10.80	.....	6.75[11]	12.00	.....	.....	10.30	.....
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	.....	18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel, 1.60. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] In bags. [11] Refuse or air slack, 10.00–12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [18] 90-lb. sacks. [19] To mortar plant and large industrials, 13.00. [20] Also 13.00. [21] To 8.00. [22] To 9.00. [23] Per bbl., 2.15. [24] Superfine, 99.25% thru 200 mesh. [25] To 16.50. [26] General purpose hydrated lime in 10-lb. paper sacks, 12.50 per ton.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Montoursville, Penn.	.....	1.25
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75
Utica and Ottawa, Ill.	1.00–3.25	.75
Warwick, Ohio	.....	2.00
Zanesville, Ohio	.....	2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton — 5.00
- Ground talc (20-50 mesh), bags — 7.50
- Ground talc (150-200 mesh), bags — 10.00
- Pencils and steel crayons, gross — 1.50– 2.50

Chester, Vt.:
- Ground talc (97-99½% thru 200 mesh, paper or burlap bags, bags extra — 7.50– 8.50
- Same, including 50-lb. Kraft paper bags — 8.50– 9.50
- Same, including 50-lb. bags — 9.00– 9.50

Chicago and Joliet, Ill.:
- **Ground (150-200 mesh), bags — 30.00**

Clifton, Va.:
- Crude talc, per ton — 4.00
- Ground talc (150-200 mesh), in bags — 12.00

Conowingo, Md.:
- Crude talc, bulk — 4.00
- Ground talc (150-200 mesh), in bags — 14.00
- Cubes, blanks, per lb. — .10

Emeryville, N. Y.:
- Ground talc (200 mesh), bags — 13.75
- Ground talc (325 mesh), bags — 14.75

Hailesboro, N. Y.:
- **Ground talc (300-350 mesh) in 200-lb. bags — 15.50–20.00**

Henry, Va.:
- Crude (mine run) — 3.50– 4.50
- Ground talc (150-200 mesh), bags — 7.50–13.00

Joliet, Ill.:
- **Ground talc (200 mesh) in bags:**
- **California white — 30.00**
- **Southern white — 20.00**
- **Illinois talc — 10.00**
- **Crude talc — 3.75**

Keeler, Calif.:
- **Ground (200-300 mesh), bags — 20.00–30.00**

Los Angeles, Calif.:
- Ground talc (150-200 mesh) in bags — 15.00–24.00

Natural Bridge, N. Y.:
- **Ground talc (300-325 mesh), bags — 12.00–15.00**

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- **Columbia, Tenn.—B.P.L. 65-70% — 3.50– 4.50**
- Gordonsburg, Tenn.—B.P.L. 68-70% — 3.75–4.25
- Mt. Pleasant, Tenn.—B.P.L., 75% — 6.50
- **Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% — 5.00**
- **B.P.L. 75% — 6.00**
- **Twomey, Tenn.—B.P.L. 65%, 2000 lb. — 8.00– 9.00**

Ground Rock

(2000 lb.)

- **Centerville, Tenn.—B.P.L. 65% — 8.00**
- Gordonsburg, Tenn.—B.P.L. 65–70% — 3.75– 4.50
- **Mt. Pleasant, Tenn.—Lime phosphate:**
- B.P.L., 73%, 80% thru 300 mesh — 11.80
- Mt. Pleasant, Tenn.—B.P.L., 72% — 5.00– 5.50
- **Twomey, Tenn.—B.P.L. 65% — 8.00**
- **Wales, Tenn.—B.P.L. 65% — 11.00**

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

- **Florida—F.o.b. mines, gross ton, 68/66% B.P.L., Basis 68% — 3.25**
- **70% min. B.P.L., Basis 70% — 3.75**

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Bedford, N. Y.—Mine scrap — 12.50–14.70
- New York City, N. Y.—Per lb.,
  - Cut mica (1½x2) — 1.60
  - Cut mica (8x10) — 26.00
- Pringle, S. D.—Mine run, per ton — 125.00
  - Punch mica, per lb. — .96
  - Scrap, per ton, carloads — 20.00
- Rumney Depot, N. H.—Per ton,
  - Mine run — 300.00–360.00
  - Clean shop scrap — 27.50–29.00
  - Mine scrap — 22.50
  - Roofing mica — a37.50–40.00
  - Punch mica, per ton — 200.00–240.00
  - Trimmed mica, per ton, 40 mesh, 42.50–45.00; 100 mesh, 60.00; 200 mesh — 100.00
- Trenton, N. J.—Mine scrap, per ton — 20.00
  - Clean shop scrap, per ton — 22.00

(a) Also 38.00–42.50 per ton.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream, and American Botticino, coral pink, pearl blush	‖12.50–‖14.50	¶12.50–‖14.50
Brighton, Tenn.—Pink marble chips	$3.00	$3.00
Crown Point, N. Y.—Mica Spar	¶9.00–‖12.00	
Davenport, Ia.—White limestone, in ba	6.00	6.00
Easton, Penn.—Royal green	16.00–20.00a	
Harrisonburg, Va. — Bulk marble (crushed, in bags)	12.50–14.00	12.50–14.00
Ingomar, Ohio — Concrete facings and stucco dash		11.00–18.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white	‖9.00–¶10.00	
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		5.50
Phillipsburg, N. J.—Royal green granite		18.00–20.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		7.90– 8.40
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00
Whitestone, Ga.	b5.00	

†C.L.; L.C.L. 16.00. ¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb.

Soda Feldspar

DeKalb Jct., N. Y.—Color, white; pulverized, 99% thru 200 mesh, in bags, per ton, 22.00, bulk 20.00; 99% thru 140 mesh, in bags, ton, 20.00; bulk.... 18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140-mesh 19.00

Bedford Hills, N. Y.—Color, white; analysis, K_2O, 12.26%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; pulverized 78% thru 100 mesh, bulk, 11.00–14.00; crude, bulk, per ton 9.00

Coatesville, Penn.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.90%; SiO_2, 67%; Fe_2O_3, .08%; Al_2O_3, 16%, crude, per ton 8.00

Trenton, N. J.—White; analysis, K_2O, 13-14%; Na_2O, 2-2½%; SiO_2, 64-65%; Fe_2O_3, 0.07%; Al_2O_3, 18.50-19.25%; pulverized, 97% thru 325 mesh, crude, 8.50 per ton, ground..... 21.00

Rochester, N. Y. 22.00

Rumney and Cardigan, N. H.—Color, white; analysis, K_2O, 9-12%; Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk 7.00– 7.50

Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_3, 17-18%, crude, bulk 7.00– 7.50

Penland, N. C.—White; crude, bulk..... 8.00
Ground, bulk 16.50

Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk 18.00
(Bags 15c extra.)

Tennessee Mills—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; 99½% thru 200 mesh; bulk (Bags, 15c extra) 18.00

Chicken Grits

Afton, Mich.—(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Centerville, Iowa	9.25
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton	10.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass.—(Limestone)	‡7.50–*9.00
Davenport, Ia.—(Limestone), bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks:	
Feldspar	14.00
Gypsum	7.50– 9.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, O. (b)—(Pearl Grit), fine and medium, per ton	¶8.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.	7.50– 9.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, 8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags. (a) F.o.b. Middlebury, Vt. (b) F.o.b. Piqua, Ohio.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Dayton, Ohio	12.50–13.50
Detroit, Mich. (h)	j13.00–16.00*d
Farmington, Conn.	16.00
Flint, Mich.	18.00†
Grand Rapids, Mich.*	14.00–15.00
Hartford, Conn.	13.00–17.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00–11.00
Lake Helen, Fla.	8.50– 9.00
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	15.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00–22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada (r)	12.50–15.00g
Wilkinson, Fla.	12.00–16.00
Winnipeg, Canada	15.00

Delivered on job. ‖Dealers' price. (a) Less 50c disc. per M, 10th of month. (d) 5% disc., 10th of month. (f) In yard, 12.00, 12.25 and 12.50. (g) Delivered in city. (h) Also 15.50. (j) Also 14.00. (r) Also 12.00.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.78¾	3.45	.....
Atlanta, Ga.	.....	1.66	3.16¶
Baltimore, Md.	.....	2.25	3.55¶
Birmingham, Ala.	.....	1.30	2.80¶
Boston, Mass.	.44½	‡1.78–1.88	3.27¶
Buffalo, N. Y.	.48¾	‡1.95–2.05	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Ia.	.....	2.04	2.99f
Charleston, S. C.	.....	2.35d	3.15¶
Cheyenne, Wyo.	.59	2.66	.....
Chicago, Ill.	.....	1.85	3.35¶
Cincinnati, Ohio	.....	1.82	3.47¶
Cleveland, Ohio	.....	1.94–2.24	3.34¶
Columbus, Ohio	.....	1.82	3.52¶
Dallas, Texas	.....	1.80	3.39¶
Davenport, Iowa	.....	2.04	.....
Dayton, Ohio	.....	1.84	3.51¶
Denver, Colo.	.63¾	2.55	.....
Des Moines, Iowa	.....	2.14	2.99f
Detroit, Mich.	.....	1.95	3.25¶
Duluth, Minn.	.....	1.84	.....
Houston, Texas	.....	1.90	3.63¶
Indianapolis, Ind.	.54¾	1.79	f2.84–3.39¶
Jackson, Miss.	.....	1.74	3.24¶
Jacksonville, Fla.	.....	2.31b	3.26¶
Jersey City, N. J.	.....	2.13	3.43¶
Kansas City, Mo.	.45½	1.82	f2.87–3.22¶
Los Angeles, Calif.	.51½	1.82	.....
Louisville, Ky.	.55½	1.82	f2.92–3.37¶
Memphis, Tenn.	.....	1.74	f2.69–3.24¶
Milwaukee, Wis.	.....	2.00	3.50¶
Minneapolis, Minn.	.....	2.02	.....
Montreal, Que.	.....	1.60	.....
New Orleans, La.	.45½	1.82	3.22¶
New York, N. Y.	.43¼	1.73‡	3.33¶
Norfolk, Va.	.....	1.37	3.27¶
Oklahoma City, Okla.	.57¼	2.16	3.69¶
Omaha, Neb.	.54	2.01	3.56¶
Peoria, Ill.	.....	2.02	.....
Pittsburgh, Penn.	.....	1.85	3.35¶
Philadelphia, Penn.	.....	2.15	3.45¶
Phoenix, Ariz.	.....	3.51	.....
Portland, Ore.	.....	2.40	.....
Reno, Nev.	.....	2.86	.....
Richmond, Va.	.....	1.50	3.62¶
Salt Lake City, Utah	.70¼	2.81	.....
San Francisco, Calif.	.....	2.14	.....
Savannah, Ga.	.....	2.31c	3.15¶
St. Louis, Mo.	.48¾	1.95	f2.65–3.25¶
St. Paul, Minn.	.....	2.02	.....
Seattle, Wash.	.....	†2.50–2.65j	k3.50†
Tampa, Fla.	.....	2.30	3.30¶
Toledo, Ohio	.....	2.03	3.50¶
Topeka, Kan.	.50¼	2.01	3.41¶
Tulsa, Okla.	.53¼	2.03	3.53¶
Wheeling, W. Va.	.....	2.12	3.42¶
Winston-Salem, N. C.	.....	1.44	3.49¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.....	2.15	.....
Bellingham, Wash.	.....	2.35†	.....
Buffington, Ind.	.....	1.60	.....
Chattanooga, Tenn.	.....	2.05	.....
Concrete, Wash.	.....	2.35	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.90	.....
Hudson, N. Y.	.....	1.75	.....
Leeds, Ala.	.....	1.65	.....
Lime & Oswego, Ore.	.....	2.50‡	.....
Mildred, Kan.	.....	2.35	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.65	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.60	.....

NOTE—Add 40c per bbl. for bags. †10c disc., 10 days. ‡10c disc., 15 days. (b) 5c bbl. refund for paid freight bill. (c) 16c bbl. refund for paid freight bill. (d) 20c bbl. refund for paid freight bill. (e) Paid freight bill taken as part payment of invoice. (f) "Velo" cement, including cost of paper bag, 10c disc. 10 days. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days. (j) 25c bbl. disc. 10 days. (k) "Velo" cement, add 20c per bbl. for paper bags.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard ⅜x32 or 48" Length 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50e	.....	.....	.....	.....	.....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 3 in. long, 17c per ft., 23.00 per ton.													
Ft. Dodge, Iowa; N. Holston, Va.; Akron, N. Y.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Grand Rapids, Mich.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Los Angeles, Calif. (f)	5.00	.....	7.50–9.50	12.20	.....	.....	12.20–14.10	13.10	29.00–40.00	11.20–13.10	.....	.....	33.75–41.25
Medicine Lodge, Kan.	.....	.....	.....	.....	.....	.....	.....	.....	15.00y	.....	.....	.....	.....
Portland, Colo.	.....	7.00	7.00	9.00	9.00	9.50	9.00	.....	27.50	.....	22.50	27.50	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00o	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash. (z)	6.00	9.00	9.00	13.00	.....	.....	14.00	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00w	.....	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable), (a) Hardwall plaster, 13.00; casting, finishing molding, 14.00; (b) Calacoustic plaster, 10.00 at mill; (c) Plaster lath; (d) ¼x48x36 in.; (e) white molding; (f) plasterboard, 18½c to 25c sq. yd.; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks; (v) retail, 35.00; (w) 16x48; (x) "Fabricaste" gypsum blocks, 2-in., 7c-8c per sq. ft.; 3-in., 7c-8½c per sq. ft. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft.; 4-in., 11c per sq. ft.

Market Prices of Cement Products and Slate

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Camden, N. J.	16.50
Cement City, Mich.	55.00¶
Chicago District‖	180.00–210.00a
8x10x16	230.00–260.00a
8x12x16	280.00–330.00a
Columbus, Ohio	15.00c– 17.00†
Detroit, Mich. (d)	.15– .17†
Forest Park, Ill.	21.00*
Grand Rapids, Mich.	11.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Los Angeles, Calif.	4x8x12–5.00*
Olivia and Mankato, Minn.	9.50b
Tiskilwa, Ill.	.16– .18†
Yakima, Wash.	20.00*

*Price per 100 at plant. †Rock or panel face. ‡Delivered. ¶5x8x12, 55.00 per 1000. (a) Face. (b) Per ton. (c) Plain. (d) 8x12x16, rock or panel face, .24–.26.

Cement Building Tile

Camden and Trenton, N. J.:	
3x8x16, per 100, 9.00; 3x9x16, per 100	9.00
4x8x16, per 100, 12.00; 4x9x16, per 100	13.00
6x8x16, per 100, 16.50; 6x9x16, per 100	15.50
Cement City, Mich.:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per 100	13.00
8x 8x16, per 100	20.00
8x12x16, per 100	28.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	6.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Cicero, Ill.—French and Spanish tile (red, orange, choc., yellow, tan, slate, gray) per sq., 9.50–10.00; green or blue, per sq.	11.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.0c
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	
3½x6x12, per M	50.00
3½x8x12, per M	60.00
Prairie du Chien, Wis.:	
5x8x12, per M	82.00
5x4x12, per M	46.00
5x8x6 (half-tile), per M	41.00
5x8x10 (fractional), per M	82.00
Yakima, Wash. (Building Tile):	Each
5x8x12	.10

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00– 40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00– 50.00
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	
Ensley, Ala. ("Slagtex")	12.50	
Eugene, Ore.	25.00	35.00– 75.00
Forest Park, Ill.		37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50– 65.00
Los Angeles, Calif.	12.50	
Milwaukee, Wis.	14.00	20.00– 50.00
Mt. Pleasant, N. Y.		14.00– 23.00
Omaha, Neb.	18.00	30.00– 40.00
Pasadena, Calif.	10.00	
Philadelphia, Penn.	15.50	
Portland, Ore.	15.00	27.50–112.00
Mantel brick—100.00–150.00		
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	30.00– 40.00
Waco, Texas	16.50	32.50–125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

*40% off List.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	26.50	45.00	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200 mesh (94-96% thru 300 mesh), $7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.50 per ton.
Granville, N. Y.—Red, green and black, $7.50 per ton.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	3/8-in.	½-in.	¾-in.	1-in.
Buckingham, Oxford, gray	13.88	19.44	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. mediums	9.50–11.25	.....	.....	.....	.....	.....
No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
No. 1 Albion clear	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Albion mediums	8.00– 9.00	.....	.....	.....	.....	.....
Chapman Quarries, Penn.—No. 1	8.50–11.25	(Vari-tone, 12.00–13.00)				
Medium	7.75– 9.00	.....	.....	.....	.....	.....
Hard vein	.....	16.00	23.00	26.00	32.00	40.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn.*						
Graduated slate (blue)	.....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	.....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 10.50–12.50; textural, 12.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00
Waukesha, Wis.—Drain tile, per ton	8.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.70	.90	1.20	.....	.....	1.80	2.10	2.35	3.50	4.00	5.60	6.90	7.85
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., 18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced (c) Delivered on job: 5% discount, 10th of month. †21-in. diameter. ‡Price per 2-ft. length.

Manufacturers' Division, Sand and Gravel Association, Meets at New York

THE MANUFACTURERS' DIVISION of the National Sand and Gravel Association held its annual pre-convention meeting at the Pennsylvania Hotel, New York City, on September 17 and 18. A representative group of manufacturers attended the informal dinner on Tuesday evening and the business meeting on Wednesday morning.

H. M. Davison, who has been chairman of the Manufacturers' Division since its origin, presided at the business meeting. It had been decided that the officers of the division would be elected at the annual fall meeting preceding the convention rather than during the convention as in the past. The new officers elected for the coming year were: Chairman, M. B, Garber, The Thew Shovel Co., Lorain, Ohio; vice-chairmen, C. H. Adamson, Stephens-Adamson Manufacturing Co., Aurora; H. M. Davison, Harnischfeger Sales Corp., New York; D. D. Guilfoil, Sauerman Bros., Chicago, Ill.; N. C. Rockwood, ROCK PRODUCTS, Chicago, Ill.; B. G. Shotton, Hendrick Manufacturing Co., Carbondale, Penn.; L. W. Shugg, General Electric Co., Schenectady, N. Y.

With the new chairman M. B. Garber presiding the following amendments to the by-laws of the Manufacturers' Division were passed: Membership of the Manufacturers' Division of the National Sand and Gravel Association to be limited to 100 members; exhibitors at the annual convention of the association must be members of the Manufacturers' Division; space for exhibits to be assigned by an allocation committee to be composed of the following members: V. P. Ahearn, Chairman; H. L. Strube, B. G. Shotton, A. Goldberg, H. M. Davison.

The following attended the dinner or business meeting: Abe Goldberg, Allis Chalmers Manufacturing Co., Milwaukee, Wis.; O. A. Olstad, Blaw-Knox Co., Pittsburgh, Penn.; W. S. Nicol, Cross Engineering Co., Carbondale, Penn.; T. S. Marvel, Dravo Contracting Co., Pittsburgh, Penn.; G. M. White, Good Roads Machinery Co., Inc., Kennett Square, Penn.; H. M. Davison, Harnischfeger Sales Corp., Milwaukee, Wis.; B. G. Dann and B. G. Shotton, Hendrick Manufacturing Co., Carbondale, Penn.; H. L. Strube, Link-Belt Co., Chicago, Ill.; V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; J. F. Berger, The New Jersey Wire Cloth Co., Trenton, N. J.; S. C. Hodge, Niagara Concrete Mixer Co., Buffalo, N. Y.; L. D. Hudson, Nordberg Manufacturing Co., Milwaukee, Wis.; L. M. Weiss, W. E. Trauffer, *Pit and Quarry*, Chicago, Ill.; A. T. Ward, Productive Equipment Corp., Chicago, Ill.; R. H. Robins, Robins Conveying Belt Co., New York, N. Y.; F. S. Peters, R. C. Sullivan, C. L. Walker, ROCK PRODUCTS; D. D. Guilfoil, Sauerman Bros., Inc., Chicago, Ill.; H. T. Smith, Seaboard Sand and Gravel Corp., New York, N. Y.; J. R. Norton, Smith Engineering Works, Milwaukee, Wis.; R. L. Ozias, Stoody Manufacturing Co., Whittier, Calif.; J. A. Trainor, Taylor-Wharton Iron and Steel Co., Highbridge, N. J.; M. B. Garber, the Thew Shovel Co., Lorain, Ohio; Alexander Foster, Warner Co., Philadelphia, Penn.

Retail Prices of Various Rock Products Materials

THE TABLE below gives average prices paid August 1, 1929, by contractors for various rock products, delivered on the job at different principal cities of the United States. These prices were secured through the Bureau of Census.

AVERAGE RETAIL PRICES FOR ROCK PRODUCTS MATERIALS, AUGUST 1, 1929

City	MATERIAL					
	Portland cement, per bbl. excl. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$3.10	.....	$21.50	$1.50	$2.25	.....
Waterbury, Conn.	3.00	$30.00	20.00	1.35	2.45	$18.00
New London, Conn.	3.00	25.00	26.00	1.50	2.40	18.00
New Bedford, Mass.	3.00	25.00	19.00	1.75	3.00	14.50
Haverhill, Mass.	2.80	27.50	20.00	1.75	.....	15.00
Poughkeepsie, N. Y.	2.28	22.00	24.00	2.50	3.50	18.00
Albany, N. Y.	2.97	24.75	18.00	.....	.....	13.50
Syracuse, N. Y.	3.15	22.50	24.00	2.35	1.80	18.00
Rochester, N. Y.	2.85	20.00	20.00	2.50	2.40	13.00
Buffalo, N. Y.	3.10	25.00	18.00	2.50	2.05	14.00
Paterson, N. J.	2.60	23.00	20.00	1.75	2.08	16.00
Trenton, N. J.	2.40	26.00	18.00	2.03	2.10	17.50
Scranton, Penn.	2.80	30.00	18.00	3.25	.....	17.00
Philadelphia, Penn.	2.35	.....	15.50	1.85	2.45	19.75
Harrisburg, Penn.	2.25	.....	19.00	4.20	1.60	20.50
Baltimore, Md.	2.65	37.50	13.00	2.00	2.75	13.50
Washington, D. C.	2.55	22.50	14.00	.....	.....	17.00
Richmond, Va.	3.10	31.00	17.50	1.95	2.45	20.00
Fairmount, W. Va.	2.90	35.00	17.00	3.25	3.40	18.00
Winston-Salem, N. C.	2.34	32.50	14.00	2.50	4.50	15.00
Columbia, S. C.	2.60	.....	18.00	1.25	1.50	17.00
Shreveport, La.	3.20	.....	22.50	2.00	4.75	24.40
Tampa, Fla.	2.40	.....	20.00	2.00	4.00	19.00
Birmingham, Ala.	2.60	.....	20.00	3.50	.....	16.00
Erie, Penn.	2.80	25.00	22.00	2.25	.....	19.00
Canton, Ohio	2.50	33.00	16.00	2.50	3.50	15.00
Akron, Ohio	$2.90	$35.00	$17.00	$2.00	$3.00	$18.00
Toledo, Ohio	.....	22.50	20.00	3.04	2.75	16.00
Columbus, Ohio	2.75	23.00	17.50	2.25	2.50	15.00
Cleveland, Ohio	2.56	22.00	16.00	2.63	2.65	12.50
Youngstown, Ohio	2.80	.....	18.00	2.75	2.75	15.00
Detroit, Mich.	2.60	24.60	14.80	2.75	3.00	18.00
Saginaw, Mich.	2.80	25.00	20.00	2.80	3.00	20.00
Terre Haute, Ind.	2.75	28.00	18.00	1.65	3.50	17.00
Rockford, Ill.	2.90	.....	16.25	1.75	2.40	16.00
Chicago, Ill.	2.00	.....	18.00	2.00	1.60	11.50
Milwaukee, Wis.	2.40	25.00	.....	1.90	1.55	18.00
Lansing, Mich.	2.85	.....	22.00	2.25	2.25	16.50
Des Moines, Iowa	2.66	23.75	20.00	1.60	3.60	.....
St. Louis, Mo.	2.45	.....	18.00	2.70	1.90	16.00
Kansas City, Mo.	2.40	25.00	24.00	1.70	1.88	18.00
St. Paul, Minn.	2.60	25.00	21.00	1.40	2.00	16.00
Sioux Falls, S. Dak.	3.10	27.00	26.00	1.50	2.25	16.00
Grand Forks, N. D.	2.80	25.00	.....	2.60	.....	16.00
San Antonio, Tex.	2.82	34.00	20.00	2.10	2.35	16.90
Tucson, Ariz.	.....	.....	30.00	1.50	2.50	18.00
Los Angeles, Calif.	2.64	34.00	24.00	1.70	2.05	10.00
Long Beach, Calif.	2.48	32.50	25.00	2.16	2.50	15.00
San Francisco, Calif.	2.80	31.75	25.50	2.00	1.75	20.00
Seattle, Wash.	2.65	32.50	22.00	1.65	.....	20.00
Portland, Ore.	2.60	27.50	25.00	2.00	1.60	19.00

No Merger Involving U. S. Gypsum

THE United States Gypsum Co. has not entered into any arrangement with the Johns-Manville Co., according to Sewell L. Avery, president of U. S. Gypsum Co.

The report said that the gypsum company, Johns-Manville and the Insulite Co. had pooled their manufacturing and distributing interests and Mr. Avery said that probably grew out of the arrangement whereby the gypsum company will distribute the products of the Insulite company and the Johns-Manville company likewise will distribute Insulite products. These arrangements in no wise affect the competitive situation between the gypsum company and Johns-Manville Co., he declared.

Bluffton Quarry Plant Burns

FIRE of unknown origin, caused heavy damage recently to the plant of the National Lime and Stone Co. at Bluffton, Ohio. Frank McElroy, superintendent of the plant, estimated the loss at $300,000. The plant was one of the largest producers of limestone products in this part of the state.

It will be rebuilt as soon as possible.—*Cleveland* (Ohio) *Plain Dealer.*

An Unusual Crushed-Stone Problem to Be Solved

WILLIAM JENNINGS, who is known to many readers of ROCK PRODUCTS as a specialist in the problems of crushed-stone and silica plant operation, has been retained by the Monon Crushed Stone Co., Monon, Ind., to attempt the solution of a unique problem. The stone is a dolomite carrying a very small percentage of bitumen or asphalt. The problem is to get rid of the bitumen. It is proposed to do it by roasting.

The Julius Keg dredge operating in Fox river, near McHenry, Ill.

Converting a 10-in. Suction Dredge to Diesel Power*

With Cost Figures on Operation

A DREDGE operated by Julius Keg of McHenry, Ill., on the Fox River near that city was equipped in April, 1929, with a Buda Diesel engine of 180 rated horsepower. It replaced a second-hand compound steam engine with boiler of approximately the same rating which had served for three years.

The change was made to gain in reliability of operation and also to reduce labor and fuel costs. The economy already demonstrated is of the order of $0.067 per cu. yd. in direct power cost, amounting to somewhat over $22,000 per season, plus a substantial added saving due to maximum utilization of the dredge during the season.

Mr. Keg does contract work and is at present engaged on a real estate development project located about eight miles south of McHenry. The dredge is used to fill in low land and will create a bathing beach.

At the time the Diesel engine was installed, all of the old machinery and the superstructure was removed, leaving only a bare hull, which was constructed with a framework of 6 in. by 8 in. timbers with 3-in. bottom planking, 6-in. end planking and 6-in. and 4-in. side planking. The size of the hull is 75 ft. by 20 ft. by 5 ft. Since the hull had been subjected to considerable strain by the use of former steam power, it was strengthened by 6-in. channels placed back to back and extending transversely on the bottom. At the sides of the hull, vertical structural members were bolted to the side of the hull and connected to the channels on the bottom of the hull by means of a gusset or knee of steel plate. On top of the transverse beams were placed longitudinal H-beams spaced 3 ft. apart, and on these H-beams the structural base of the engine and the pump base were mounted.

Referring to the cut showing the interior of the dredge, it will be noted that the engine and pump center line are not at right angles with the center line of the dredge. This method was adopted to secure proper rotation of the pump without changing the suction or discharge and to secure proper trim of the load in the hull. Installing the engine in this manner also facilitates the connection of suction and discharge lines. The present arrangement permits ample working space around the engine and pump and the cuts will illustrate the amount of available working space.

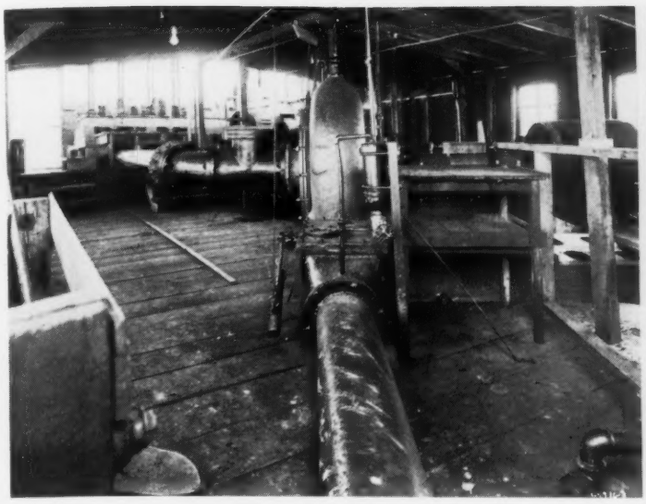
Lighting is taken care of by means of a 1½-kw. gasoline-driven generator set. This provides light at all times, even though the main engine or cutter head engine is not in operation.

Priming is taken care of by means of a Morris 2½-in. pump, which is driven from the shaft supplying power to the cutter head. Priming is by means of a Penberthy ejector, operated from the above pump. Power for this pump and the cutter head and hoist is supplied by a 40-hp. gasoline engine, which was used in connection with the former equipment.

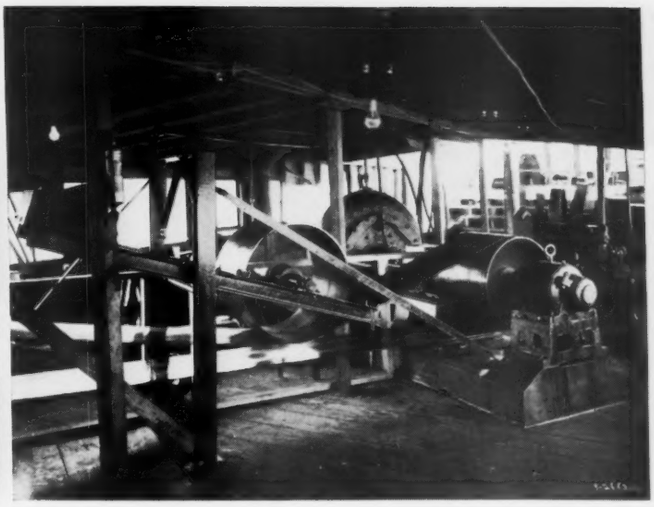
A 2-in. service pump, driven from a pulley on the Diesel engine, supplies water to the pump bearings and for servicing. A line from this pump also extends to the cutter head bearings. It will be noted that a flap valve is placed in the discharge line close to the 10-in. American Manganese Steel Co. pump.

Pressure and vacuum gages are placed in a convenient position, so that the operator can see them at all times. A line has been run from the Diesel engine to the operating station showing oil pressure on the lubricating system at all times. Cable controls have been extended to the operating position so that the Diesel engine speed may be increased or decreased to suit the conditions

*Data supplied by the Buda Co., Harvey, Ill., and the A. C. Nielsen Co., Chicago, Ill.



The 10-in. dredging pump, belt-driven by Diesel engine



Details of the belt drive of the Diesel engine

of operation without the necessity of walking back to the engine.

Power take off from the engine is by means of a Twin Disc clutch, totally enclosed with an extension shaft supported by a Timken, outboard, roller-bearing. The drive pulley on the engine is a Rockwood paper type. The clutch can also be handled from the operating position. One man only is required on the dredge for each shift and the entire equipment is under control from his station at the front end of the dredge.

The engine pulley is 18 in. diameter by 22 in. face. The belt is two-ply endless leather with a center distance of 13 ft. The idler pulley, which may be seen in the cut, is used to maintain proper tension on the belt.

Starting equipment for the Diesel engine consists of a small air-cooled, two-cylinder, opposed-type, gasoline engine, mounted directly on the flywheel housing and starting the main Diesel through a special type of Bendix drive. Compressed air is not required for any purpose on this dredge.

The power unit weighs, complete, 12,700 lb. The overall length, from the radiator to the end of the power take off shaft is 138 in. The overall width is 49 in. Height over radiator filler cap is 89¼ in. The silencing of exhaust is handled by a Maxim silencer.

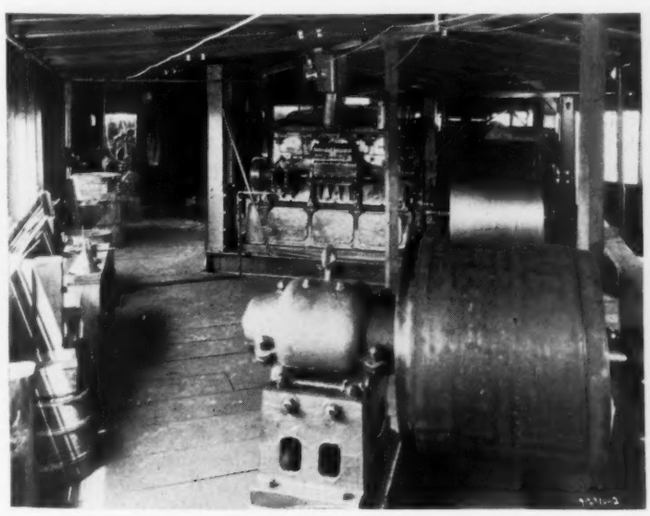
The main engine is provided with lubricating oil filters, reservoir, and cooler, mounted on the engine. All of the intake air is filtered, preventing the entrance of dust or abrasive matter to the cylinder walls or bearings. Fuel is also filtered through a screen filter of very fine mesh.

The first run of this engine covered a period of 26 days, in which time the dredge operated on an average of 9¼ hours per day. During this period approximately 20,000 cu. yd. of material was handled, which ranged from black dirt to sand and gravel. The principal part of this work consisted of removing an island, to form a motor boat harbor. For several months this engine has been operating on a 20-hour per day schedule.

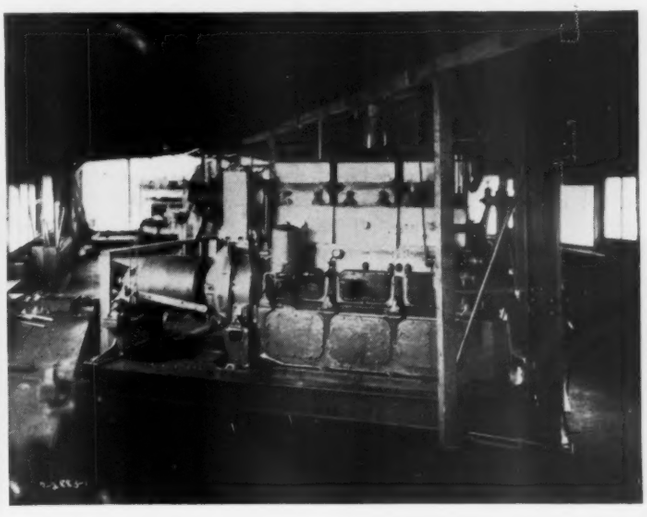
It is interesting to note that when this engine was transported from the factory to the job, it was handled on a truck and shipped completely assembled, eliminating necessity of rebuilding or aligning the unit after installation. It was merely necessary to install it on the foundation beams and bolt it down and to make connections for the exhaust line and the fuel lines.

Engine: The Diesel is a standard 6-cylinder Buda engine capable of operating at any speed up to 900 r.p.m. and delivering 180 hp. at full load and speed. It is belted to the pump. Operating speeds are from 650 to 850 r.p.m. at the present time.

Relative capacities: A 10-in. pipe line is carried inland for 400 to 1400 ft. With the steam engine the maximum length was found to be 1000 ft. whereas the Diesel has ample power and pumps double the former yardage at 1000 ft. and loses only a small



Interior of the dredge, looking toward the stern



The 180-hp. Diesel engine, main power plant of the dredge

percentage of capacity at the maximum length of pipe line so far used. The following are approximate capacities for the two sources of power:

Length of pipe	Yards per hour Steam engine	Diesel
400 ft.	90	90
600 ft.	70	90
800 ft.	60	85
1000 ft.	40	80

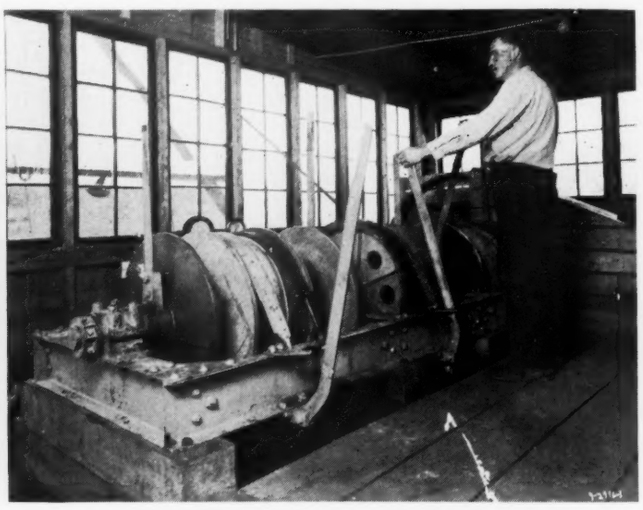
The average length of pipe used is 550 ft., at which the engine delivered about 80 cu. yd. and the Diesel now delivers 90 per hour. dredge and laying new pipe lines and not to the failure of the engine to operate.

When steam power was used, 5 hours a week were spent in washing the boiler and an average of fully another 5 hours for repairs to engine, boiler, feed pumps, etc. This down time was in addition to the time now lost for moving the dredge and general dredge repair which accounts for the present figure of 90% actual pumping time. The number of actual pumping hours per

Operating costs per shift are made up of the above fixed charge, fuel, lubricants, boiler compound and miscellaneous supplies and labor.

For steam operation, fuel costs were high. The average consumption for a 10-hr. shift was 3½ tons of coal at $8.50 a ton or $29.75 delivered at the shore line. Delivery to the dredge cost an additional $0.50 a ton, one man at $6 a day handling 12 tons from shore to dredge.

Priming pump and drive for cutter head and hoist



Operator at controls and hoisting drum

The failure of steam operation was not due to any inherent deficiency in steam as a motive power but to the fact that the engine could not be speeded up sufficiently to carry the necessary pressure on the line, this being partly due to boiler trouble.

Dredge operation tended to foul the water used as boiler feed and neither filtering nor boiler compounds were able to correct the trouble. As a result, water carrying solids went over with the steam and scored the cylinders. Repairs were frequent on boiler, feed pumps and engine.

To date there have been no operating troubles with the Diesel engine.

Operation

For each swing of the dredge about one foot of depth is taken. The dredge is stepped ahead 30 in. at a time, the width of the cutter, for each cut. About three minutes are required for the full swing.

The dredge is operated about eight months of the year. When the steam engine was in use only one 10-hour shift was worked for 6 days a week but with the Diesel in service operation was so free from trouble that two shifts were started. That practice has been continued.

Records kept by Mr. Keg show that for the entire period of Diesel operation, 90% of the operating time has been spent in actual pumping, or 9 hours a shift, the lost time being almost entirely due to moving the week was thus 54 less 10 or 44 hours, an average of 7.3 hours per shift.

Comparative Operating Costs

The steam engine was purchased for $250 and cost $60 for trucking and $48 for labor to bring to the shore. About $1,000 was spent for boiler, foundation material, feed water pumps and complete installation, making a total of $1,358.

The first cost of the Diesel engine is $12,140 plus $45 for trucking and approximately $75 for installation. Fuel oil tanks cost about $300, making a total of $12,560.

In Table A are set up in parallel columns the fixed and operating costs for both power units. Depreciation and average interest are based upon a life of 10 years, although it is thought that both the steam and Diesel engines might be expected to serve for far more than that period, particularly on an operation of this type. No record exists on repair and maintenance costs on the old equipment but it is estimated that not less than $800 was spent per year. The Diesel engine has not been in service for long enough to show any repair costs and an allowance of 2½% or $250 is made. The total fixed charges are thus $980.61 for the steam unit and $1,920.48 for the Diesel unit. These correspond to costs per shift worked of $4.71 and $4.62, respectively. The effect of operating the steam unit for two shifts daily will be discussed in later paragraphs.

The consumption of fuel oil by the Diesel engine averages 50 gal. per shift at a cost of $0.065 per gallon or $3.25 per shift. Fuel is delivered from a truck on the shore to the dredge at a cost of $2.40 for labor for an 805-gallon tank load or $0.15 per shift.

Lubricant is estimated to cost about $0.35 per shift for the steam engine and ¾ gal. of $0.65 oil is now used per shift on the Diesel, costing $0.49 per shift. Boiler compound and miscellaneous supplies cost approximately $1.00 per shift under former operation and $0.20 is now allowed.

Steam operation required an engineer at $10 per shift and a fireman at $7. Present operation is without the fireman.

The total costs per shift are thus found to be $54.56 for steam operation and $18.71 for Diesel operation. With 7.3 and 9.0 hours of actual pumping, the costs per hour of pumping become $7.47 and $2.08, respectively.

Unit costs for power under the actual conditions of single-shift operation for steam power and double shift for Diesel power are thus $0.0934 and $0.0231 per cu. yd., respectively. In Table B comparative costs for power are shown under conditions of double-shift operation for the steam unit. In that case it is estimated that an additional $300 would be expended for maintenance and repair on the steam plant for double hours of operation. By adding this figure to the total fixed charges on Table

A, the total fixed charges per shift are shown to be $3.07 for the steam and $4.62 for the Diesel units.

Operating costs would be the same per shift as in Table A except for the change in fixed charge on the steam unit. The total per shift is shown to be $52.92 for the steam unit, corresponding to a cost per cubic yard of $0.0906. For the Diesel unit the figure remains as before or $0.0231.

The difference shown in cost per cubic yard for double-shift operation of both units is thus $0.0675. Pumping an average of 810 cu. yd. per shift the saving per shift is $54.67. At steady operation for a full season at this rate—416 shifts the saving would be $22,742.72. The entire first cost of the Diesel unit will be returned nearly twice in the full season at the above rate, if 400 shifts can be worked.

An added saving in fixed charges is effected due to fuller utilization of the dredge through avoidance of lost time for equipment repairs. This is comparatively small but with approximately $20,000 of capital tied up in the dredge over the cost of the Diesel engine, the importance of a full operating schedule is evident.

TABLE A—COMPARATIVE POWER COSTS ON DREDGE STEAM ENGINE VS. DIESEL ENGINE DRIVEN

Investments:	Steam	Diesel
Steam engine, second-hand	$ 250.00	
Trucking and labor*	108.00	
Boiler and installation	1,000.00	
	$ 1,358.00	
Total for dredge, approx.	$21,000.00	
Diesel engine	$12,140.00	
Trucking and labor*	120.00	
Fuel tanks*	300.00	
		$12,560.00
Total for dredge, approx.		30,000.00
Fixed Charges on Power Equipment:		
Depreciation—10-yr. life	$ 135.80	$ 1,256.00
Average interest at 6%	44.81	414.48
Maintenance and repair:		
Engine and boiler, 208 shifts	800.00	
Diesel engine, 416 shifts		250.00
Totals:		
Per season	$ 980.61	$ 1,920.48
Per shift, 208 and 416	4.71	4.62
Operating Costs per Shift:		
Fixed charge as above	$ 4.71	$ 4.62
Fuel:		
3.5 tons coal at $8.50 at shore	29.75	
Delivery to dredge at 50c/ton	1.75	
50 gal. oil at $0.065 at shore		3.25
Delivery to dredge, $2.40/805 gal.		.15
Lubricant	.35	.49
Boiler compound and miscellaneous supplies	1.00	.20
Labor: Engineer and fireman	17.00	
Engineer		10.00
Totals: Per shift	$ 54.56	$ 18.71
Per hour of actual operation, 7.3 and 9 hours	7.47	2.08
Unit Cost for Power:		
At rates of 80 and 90 per cu. yd. per shift	$ 0.0934	$ 0.0231

*Estimated.

NOTE: The above is for different hours of operation. A fairer comparison is given in Table B, based on double shift operation for both.

TABLE B—COMPARATIVE POWER COST FOR DREDGE OPERATION BASED ON DOUBLE-SHIFT OPERATION OF STEAM AND DIESEL UNITS

Annual Fixed Charges:	Steam	Diesel
Fixed charges from Table A:		
Steam, for 208 shifts	$ 980.61	
Added repair expense for second shift (estimated)	300.00	
Diesel, as before		$ 1,920.48
Totals:		
Per year of 416 shifts	$ 1,280.61	$ 1,920.48
Per shift	3.07	4.62
Operating Cost per Shift:		
Fixed charges as above	$ 3.07	$ 4.62
Fuel, lubricant, supplies and labor as in Table A	49.85	14.09
Totals:		
Per shift	$ 52.92	$ 18.71
Per hour, 7.3 and 9	7.25	2.08
Per cu. yd., 80 and 90	0.0906	0.0231
Saving Over Steam Power:		
Per cu. yd.		$ 0.0675
Per shift on Diesel yardage		54.67
Per season of 416 shifts		22,742.72
Net return on investment in Diesel power unit		181%

American and British Power Shovel Manufacturers to Co-operate

THE PARTNERSHIP AGREEMENT between the Bucyrus-Erie Co., South Milwaukee, Wis., and its former competitor, Ruston and Hornsby, Ltd., Lincoln, England, is expected to result in the old world discarding the hand shovel. Interesting is the fact that here are two internationally known corporations that before were commercial rivals now exchanging patents and designs with the view of teaching the rest of the world really how to dig with machines.

Despite the fact that the Bucyrus-Erie Co. is located in inland America, the Milwaukee company has been decidedly successful in the export market. Its giant excavators built the Wembley stadium in England, the British naval base at Singapore and tremendous irrigation projects in India.

When the American firm won the contracts there was a howl throughout Great Britain, with the famous Ruston and Hornsby Co. leading the protest that unemployed British labor was being denied work by the British government favoring American equipment. The answer to the widespread protest was that the American machines had proven their ability to do the work.

The deal whereby the name of the British firm was changed to Ruston-Bucyrus, Ltd., is not a merger, according to W. W. Coleman, president and chairman of the Bucyrus-Erie board and chairman of the board of the British company.

"The two companies are going to be partners," stated Mr. Coleman. "Our export business has been rapidly expanding and we have long realized the importance of having a manufacturing center nearer this export market—principally the British empire."

There is to be a free exchange of patents, with the British company making full use of features employed in building the excavators and dredges, which are used to dig gold and coal and to make river channels.

"Since the war wages have been more of a factor in construction and excavation costs in the old world," continued the Bucyrus-Erie president. "In America we were forced to use machines for digging early. One factor was the restricted immigration laws and once industry turned to machines for excavation it was found more economical than hand labor. And speed counts."

The British company, it was stated, will expand its market for the small and medium type machines, with the larger types being built in South Milwaukee. The association also enables the company to reach certain of the colonial countries on a lower tariff basis, such countries as Australia having a preferential rate for British made goods.—*Milwaukee* (Wis.) *Journal.*

Proposed Revision of Method For Computing Depletion of Quarries

TWO NEW METHODS for determination of depletion allowances in computing federal taxes on the bases of a fixed rate per unit and on a basis of a percentage of gross income—to correct what are stated to be inequities with particular reference to mining and quarrying—excessive allowances and uncertainty and undue expense are proposed in a preliminary report made public September 23 by the joint (congressional) committee on internal revenue taxation.

The report has been ordered printed for information and discussion, but has not yet been considered or approved by the members of the committee.

The report says the present system of determining depletion is "neither simple in application nor equitable in results, and it is desirable to find a substitute for this system." The investigators report proposes:

(1) A fixed rate per unit system, consisting of the allowance of a fixed amount per pound for the mineral sold, a system which, while never adopted in the United States, is applied in Canada in determining the depletion in allowance for coal; and

(2) The percentage of gross income method, which was proposed in a brief submitted to the ways and means committee when it was considering the pending revenue bill.

Methods Proposed for Consideration. Several methods for computing depletion are proposed for consideration. They are as follows: (a) Fixed rate per unit method, (b) percentage of gross income method, and (c) depletion based on percentage of net income, consisting of plans (1) and (2). Both the fixed rate per unit method and the percentage of gross income method involve a wide departure from the allowance authorized by existing law and appear to produce inequities in the case of certain industries. Plan No. (1) of the percentage of net income method is based upon a percentage of net income from the property and is similar to the method adopted by Canada. Plan No. (2) is based upon a percentage of net income adjusted so as to allocate a reasonable amount of such net income to plant investment. This last plan when applied to concrete cases appears to produce more equitable results than the first plan.

New Machinery and Equipment

Dry Dust Collector Features Barbed Plate Design

THE BARBED plate type, dry dust collector manufactured by the By-Products Recoveries, Inc., New York, N. Y., is claimed to be particularly adapted to the collection of dusts ensuing from cement mill, gypsum mill and other rock products grinding operations, where gas to be treated is hot, carrying a high percentage of moisture or other substance. The design is based on the observed phenomenon that fine dust, floating in a gas stream, when blasted against a rough surface, will adhere to it. Why it does this is not definitely known, but the theory, which has some confirmatory facts, is that the particles of dust, as they move round in the gas stream, become electrostatically charged, and this causes them to adhere to all surfaces.

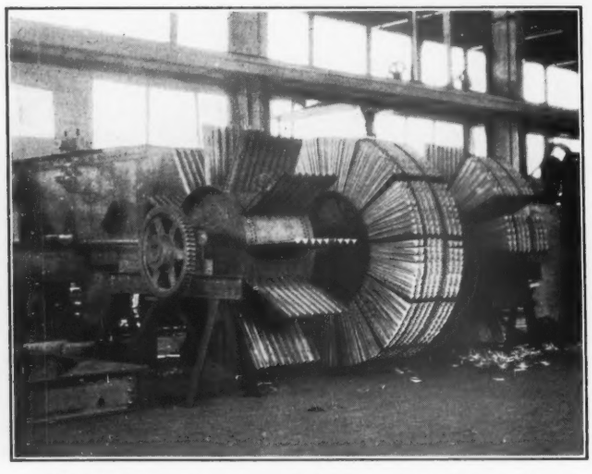
The dust collecting elements consist of metal plates pierced with numerous small holes, the metal being pushed out to form barbs around each hole. The plates are then deeply corrugated. When installed in the machine these barbed waved plates form narrow sinuous gas passages through which the gas is forced or drawn by a fan or other convenient means. In passing through the machine the direction of travel of the gas between the plates is such that it is said to come in contact with all parts of the plates, and in the parallel portions of the corrugations the reduced area causes a nozzle effect, so that the gas alternately passes through the nozzle and into an expansion space numerous times in passing through the machine.

Rather low velocities are used, and this as well as the small mass of the particles which are carried in the gas streams removes all possibility of cutting the plates, it is said. The heavier particles settle by gravity as the gas passes through the machine.

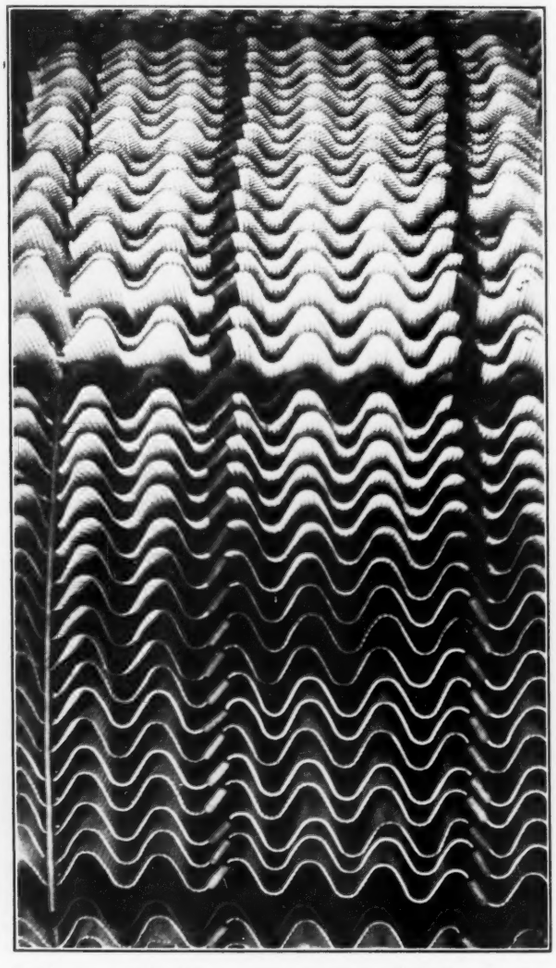
After the plates have become coated with dust, the gas is diverted by dampers from a small section of the plates and a rapping device vibrates them. The dust falls into a sectionalized dust hopper below the plates. The dust is removed continuously from the machine by means of drag chains or screw conveyors, which are sealed against leakage at the exit point.

The loss in pressure across the machine is claimed to be quite low, usually less than 1 in. of water, and is also said to be constant for any given flow of gas. The ma-

Rotor for "round horizontal" type of dust collector with parts of plates in place



The 25,000-c.f.m. type before installing dust sheets



Barbed waved plate on a new type of dust collector

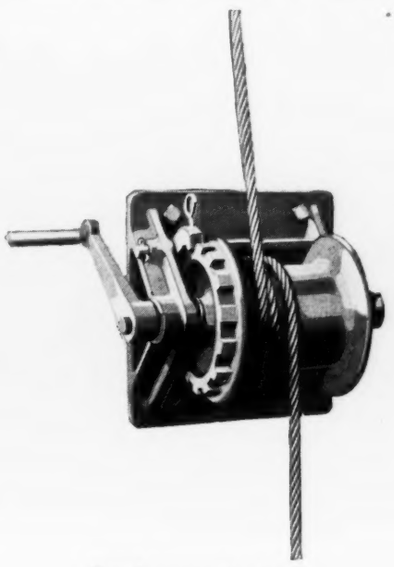
chine is entirely automatic in its action, only requiring the usual mechanical attention and oiling. It is built in two types, the "Round Horizontal" for capacities up to 7500 c.f.m., and for sizes larger than this the "Rectangular" type is used, which may be at any size up to 100,000 c.f.m.

The machine is built on the unit principle and may be varied in design to meet given conditions as to size, capacity, efficiency, etc. Water vapor is said not to interfere with its operation, providing the temperature is above dewpoint. In the case of corrosive gases, special metals to withstand the action are used in the construction. The collector may be placed anywhere in the gas line, the manufacturers say, and can also be adapted to the limits of almost any space conditions. Power requirements are said to be low; the only moving parts are the conveyors, rapping hammers, drag chains, dampers and the shaft carrying the plates and these move at a slow speed. Gas temperatures up to 600 deg. F. can be handled readily, the manufacturers say.

Almost any percentage of recovery can be obtained by adding sections in the direction of the gas travel in the machine, the manufacturers state. On several machines built a guarantee of 99½% of the dust which will be retained on a 50-mesh screen, 98% of the dust which will be retained on a 100-mesh screen, and 95% of the dust which will be retained on a 200-mesh screen, with a corresponding percentage of the finer dust, depending on its size, has been easily met, according to the claims made in a recent announcement.

New Hand Power Winch

STEPHENS-ADAMSON Manufacturing Co., Aurora, Ill., has added a new hand power winch to its line of light hand and motor driven hoists. This new winch is designed for fast action in raising and lowering counterweighted chutes, spouts, gates, doors, etc. One man, it is claimed, can easily raise or lower loads up to 60 lb. at a speed of about 50 f.p.m. The winch can be operated in either direction and is equipped with a positive safety pawl which engages to hold the drum from rotating backward or forward.



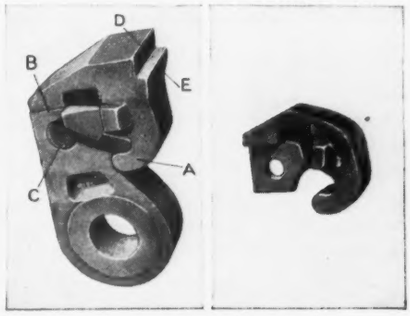
Hand-powered winch

The flanged 5-in. dia. drum rotates in a cast frame and is driven directly by a hand crank without worms or gears. The special pawl shown engages with the square tooth ratchet cast on one flange and will hold the load until released by the operator.

The winch illustrated is one of 12 used in an Illinois gravel plant for raising and lowering loading chutes.

Renewable-Tip Crusher Hammer

A RENEWABLE-TIP hammer, in sizes to suit any of the standard hammer mills, has been developed by W. C. Briggs, Bankers Trust Building, Philadelphia, Penn. In the patented design, the masses are so disposed that both centrifugal force and the hammer impacts tend to lock the parts together, according to the manufacturer. There is said to be no looseness from contact and further, it is claimed, that whatever amounts may occur from abrasion of the bearing surfaces is immediately taken up by centrifugal force. The mass of the arm and the mass of the tip are said to operate exactly as in a solid hammer, because of the stated absence of slack.



Details of renewable-tip hammer for hammer mills

The accompanying cut shows the new device: The hammer arm and tip have a hook-shaped interlock *A*. When assembling, the hook is first engaged, and the tip then swung back as on a hinge, till bearing surfaces *B* are in contact. Rivet *C* is then inserted and headed. The center of gravity of the tip is forward of the hook. Hence the effect of centrifugal force is to hold the bearing faces *B* firmly in contact. It is not necessary for rivet *C* to be tight just so long as it cannot come out, though a reasonable effort is made to have it fill the hole, the makers say.

The tip is designed solely for maximum performance on one face; hence it can be given back and side clearances. These clearances are claimed to reduce the power consumption and give a more uniformly-crushed product. Wet stone and clay can be handled with this set-up, it is claimed.

Long life for the tip it is said, is secured by having two cutting edges. At first only the outer edge *D* operates. The second, *E*, comes into action when the outer edge has been worn away and the arms are set out. About 37% of the weight of the Briggs hammer is in the renewable tip; this is the only amount to be scrapped until the bearing surfaces of the arms are worn. The manufacturers say that it is possible to use about 10 sets of tips to one set of arms befor final replacement.

The manufacturers offer as a typical case the following: A set of 39 hammers in a hammer mill weighs about 3900 lb. When discarded, the weight has been reduced some 15%, and the balance, 3315 lb., is scrapped. A set of Briggs tips for the same mill weighs about 1250 lb. This makes a saving of 2650 lb. on each renewal.

The Briggs hammers have been in use at an eastern portland cement mill for over a year and are said to have given excellent results on a hard and abrasive limestone.

Dust-Tight Enclosures for Motor Starters

THE DEVELOPMENT of dust-tight enclosing cases for their across-the-line automatic starters, is announced by Cutler-Hammer, Inc., Milwaukee, Wis.

These new enclosures are built in two types: For motors up to 5 hp., the case is of cast-iron and for larger sizes it is made of heavy welded boiler plate. In addition to being dust-tight, the small cast-iron enclosure is also claimed to be weatherproof. It has the start, stop and reset buttons mounted directly in the cover. The larger sizes have the reset button only in the cover and a separate dust-tight pushbutton station provides remote control.

The new dust-tight equipment will not replace Cutler-Hammer's standard dust-proof enclosures, but is to be offered as an option for installation in industries where the large amount of dust in the air may interfere with the efficient operation of the starter.

Steel Belt Conveyors

CATALOG No. 17, "Steel Belt Conveyors," gives a general description of the flexible steel conveyor known as the Sandvik belt. These belts, in arrangement and operation, are quite similar to the usual rubber conveyor belt. They are made of high carbon, cold rolled, hardened and tempered steel in one-piece lengths of 250 and 350 ft. Several finishes such as electro-tinned or galvanized are available.

The distributor is the Bodinson Manufacturing Co., San Francisco, Calif.

Production of Stone in 1928

PRODUCTION OF STONE in the United States in 1928, exclusive of stone manufactured into lime, cement and abrasive materials, or crushed into sand, amounted to 133,869,510 short tons, valued at $196,820,697, according to a compilation of reports from producers made by the United States Bureau of Mines, Department of Commerce. The figures show a decrease of 2% from the 1927 production figure of 136,345,130 short tons.

Stone sold for flagging, rubble, furnace flux, manufacturing industries and miscellaneous uses increased in quantity and stone sold for construction, monumental stone, paving blocks, curbing, crushed stone, riprap, agricultural limestone and refractory decreased.

Building Stone

The building stone sold amounted to 30,795,530 cu. ft.—4% less than in 1927. This includes stone for architectural work and relatively low-priced stone for rough construction, such as foundation, bridges and unshaped face stone for buildings and retaining walls.

More than one-half of the building stone sold was limestone—17,641,370 cu. ft., valued at $20,193,963, this quality being 2% more than in 1927.

Total sales of granite for building stone (6,704,430 cu. ft., valued at $7,671,013) represented nearly one-fifth of the building stone produced in 1928 and increased 5% in quantity from 1927. The granite sold for architectural work, including rough and dressed stone, was 2,417,870 cu. ft., valued at $6,956,689.

Total sales of sandstone for building (2,622,690 cu. ft., valued at $2,643,277), a decrease in quantity of 34% from 1927. Sandstone for architectural work, including rough, sawed and finished stone, amounted to 1,940,740 cu. ft., valued at $2,493,967. Ohio produced 1,390,630 cu. ft. Kentucky, New York, Pennsylvania, Wisconsin and other states also reported considerable amounts.

Marble sold for building stone in 1928 amounted to 3,024,640 cu. ft., valued at $12,109,327, 7% more in quantity than in 1927. The principal states producing building marble are Tennessee (1,190,760 cu. ft.), Missouri (606,280 cu. ft.), Vermont (655,180 cu. ft.) and Georgia (210,860 cu. ft.). Alabama, Alaska, Arkansas, California, Colorado, Maryland, Massachusetts, New Jersey, New York, Pennsylvnia and Utah also furnish marble for building purposes.

There was also sold 53,840 short tons of serpentine, valued at 104,764. The total sales of marble reported from Carthage, Mo., for 1928 were 465,390 cu. ft., valued at $1,033,158, an increase in quantity of 33% over 1927. This includes a small quantity of monumental stone.

Basalt showed a small increase in quantity over 1927, and various miscellaneous varieties of stone used chiefly for rough construction showed a large decrease.

Monumental and Memorial Stone

Stone sold for monumental and memorial work in 1928 amounted to 4,203,780 cu. ft., valued at $14,966,498, a decrease of 3% in quantity.

Granite (including rough and dressed stone) reported as sold for this purpose in 1928 was 3,172,730 cu. ft., valued at $11,217,229, a decrease of less than 1% in quantity.

Sales of marble for monumental work (including rough and finished stone) in 1928 were reported as 1,031,050 cu. ft., valued at $3,749,269, a decrease of 8.5% in quantity. Vermont produced 587,120 cu. ft., Georgia 331,340 cu. ft. and Alabama, Arkansas, Colorado, Massachusetts, Missouri, New York and Tennessee much smaller amounts.

Street and Road Work and Concrete

Street and road metal in general showed decreased sales in 1928. Paving blocks (35,426,860 blocks, valued at $3,113,526) decreased 8% in quantity. Stone sold for flagstone (932,900 cu. ft., valued at $717,049) increased 26%. Stone sold for curbing (4,832,160 cu. ft., valued at $4,698,313) decreased slightly. Total crushed stone amounted to 91,265,360 short tons, valued at $94,186,259 in 1928, a decrease of 4% in quantity. Crushed stone for concrete and road work (74,384,490 tons, valued at $81,041,349) decreased 5% in quantity and crushed stone reported as used for railroad ballast (16,880,870 tons, valued at $13,144,910) increased 3%.

Fluxing Stone

Stone sold for fluxing to blast furnaces, open hearth steel works, smelters and other metallurgical plants amounted to 23,123,870 short tons, valued at $16,957,264, an increase of 7% in quantity.

Refractory Stone

Stone reported for refractory use, which includes dolomite, quartzite and mica schist, amounted to 1,348,160 short tons, valued at $1,745,066, in 1928, a decrease in quantity of 1%. Raw dolomite reported sold for the manufacture of refractories in 1928 amounted to 522,850 short tons, valued at $509,502. Besides this quantity, operators who both quarry and dead-burn or sinter dolomite reported 448,761 tons of sintered material, valued at $4,283,036. The quantity of raw dolomite reported was 20% more than in 1927, and the sintered material also increased 20%. Quartzite (ganister) used in the manufacture of refractory brick, for furnace lining and for the manufacture of ferrosilicon, amounted to 790,630 short tons, valued at $1,098,945. This was a decrease of 12% in quantity. Sales of mica schist for furnace and kiln lining, which is quarried in Montgomery county, Pennsylvania, near Edge Hill, amounted to 34,680 tons, valued at $136,619, an increase in quantity of 24%.

Sales in 1928 of pulverized limestone for agricultural use amounted to 2,186,870 tons, valued at $3,153,848, a decrease of less than 1% in quantity from the sales for 1927.

The accompanying tables show the sales of stone in 1928 by kinds and by uses and the corresponding sales for 1927 for comparison.

STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1927 AND 1928, BY KINDS

Kinds	1927 Short tons (approximate)	1927 Value	1928 Short tons (approximate)	1928 Value
Granite	10,706,740	$ 35,287,206	9,556,500	$ 33,994,527
Basalt	13,210,570	17,399,949	15,327,760	19,693,945
Marble	600,060	15,625,872	579,490	16,402,986
Limestone	99,662,270	112,439,824	96,864,650	110,231,974
Sandstone	5,050,600	10,923,035	4,716,530	10,498,440
Other stone	7,114,890	6,971,336	6,824,580	5,998,825
Total	136,345,130	$198,647,222	133,869,510	$196,820,697

STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1927 AND 1928, BY USES

Use	1927 Quantity	1927 Value	1928 Quantity	1928 Value
Building stone, cubic feet	32,104,200	$ 40,595,127	30,795,530	$ 42,769,904
Short tons, approximate	2,485,120	.....	2,453,330	.....
Monumental stone, cubic feet	4,325,390	14,978,691	4,203,780	14,966,498
Short tons, approximate	358,000	.....	347,760	.....
Paving blocks, number	38,705,560	3,583,400	35,426,860	3,113,526
Short tons, approximate	366,740	.....	349,290	.....
Curbing, cubic feet	4,862,580	4,939,716	4,832,160	4,698,313
Short tons, approximate	378,230	.....	383,070	.....
Flagging, cubic feet	737,680	573,736	932,900	717,049
Short tons, approximate	55,160	.....	74,900	.....
Rubble, short tons	809,020	998,108	907,890	1,249,703
Riprap, short tons	4,618,500	4,716,731	3,993,190	3,865,895
Crushed stone, short tons	94,948,770	97,474,267	91,265,360	94,186,259
Furnace flux (limestone and marble), short tons	21,666,070	15,985,525	23,123,870	16,957,264
Refractory stone (ganister, mica, schist and dolomite), short tons	1,362,920	1,710,708	1,348,160	1,745,066
Agricultural limestone, short tons	2,206,470	3,360,704	2,186,870	3,153,848
Manufacturing industries (limestone and marble), short tons	5,352,130	4,735,114	5,639,750	4,723,810
Other uses, short tons	1,738,000	4,995,395	1,796,070	4,673,552
Total (quantities approximate in short tons)	136,345,130	$198,647,222	133,869,510	$196,820,697

Gravel Carrier "Andaste" Lost With Entire Crew

THREE pieces of wreckage floating near Holland, Mich., gave first evidence that the gravel carrier *Andaste* had gone down in a violent storm on Lake Michigan, on the night of September 9. The boat had been reported long overdue in Chicago and the wreckage was sighted after three days of searching by airplane, motorboat and other sources. The entire crew of 25 went down with the ship, several of the bodies having been recovered.

The *Andaste,* owned by the Andaste Steamship Co. of Cleveland, left on September 9 from Grand Haven, Mich., for Chicago, with a cargo of 1900 tons of sand and gravel for the Construction Materials Co. It is believed that it ran into the storm only a few hours out of Grand Haven and the sweeping waves filled part of the hold with water. The mixture of water and sand being extremely difficult and practically impossible to pump, the boat became overweighted and sank. From indications it is thought that the crew took refuge from the storm in the cabin and were imprisoned there when the boat went down. Even if given time to man lifeboats aboard the vessel, lake men said that the chances of weathering the gale in small open boats would have been exceedingly slim.

The ship was 37 years old, of steel construction, with a capacity of 2200 tons. It carried no radio equipment. The *Andaste* was a sister boat to the *Clifton,* which sank in Lake Huron about three years ago. The *Clifton* had 28 men aboard and was carrying a load of stone when it encountered the storm which sunk it.

The *Andaste* had been in the service of the Construction Materials Co. for the last two years, having been chartered from her owners. On inspection last April, she was declared seaworthy at the time. A customary investigation of the wreck and its causes will be made, according to reports.

Consumers Company Plans Absorption of Producing Units

PROBABILITY of completion of one of the most important consolidations in building material industry in years is seen in recent action of directors of Consumers Co. in calling a special meeting of stockholders for September 30 to vote on proposed changes in capitalization of company which will permit issuance of debentures and will increase number of authorized common shares to 3,000,000 from 1,000,000.

This is taken to indicate that company is preparing to exercise options which are understood to have been held for acquisition of A. C. O'Laughlin Co., Central Lime & Cement Co., and Wisconsin Lime & Cement Co. Early this year it was rumored that Consumers Co. had obtained options on these properties, and about a month ago it was understood that Consumers had taken control of the Wisconsin company. — *Wall Street Journal.*

First Shipment of Bulk Cement to Seattle

SHIPPING cement in bulk rather than in paper or cloth sacks is an innovation of the industry introduced in the Pacific northwest by Superior Portland Cement, Inc., at its plant in Concrete, Wash. This method has been used in the east for some time, but the Superior company was the first to put it in practice in this part of the country.

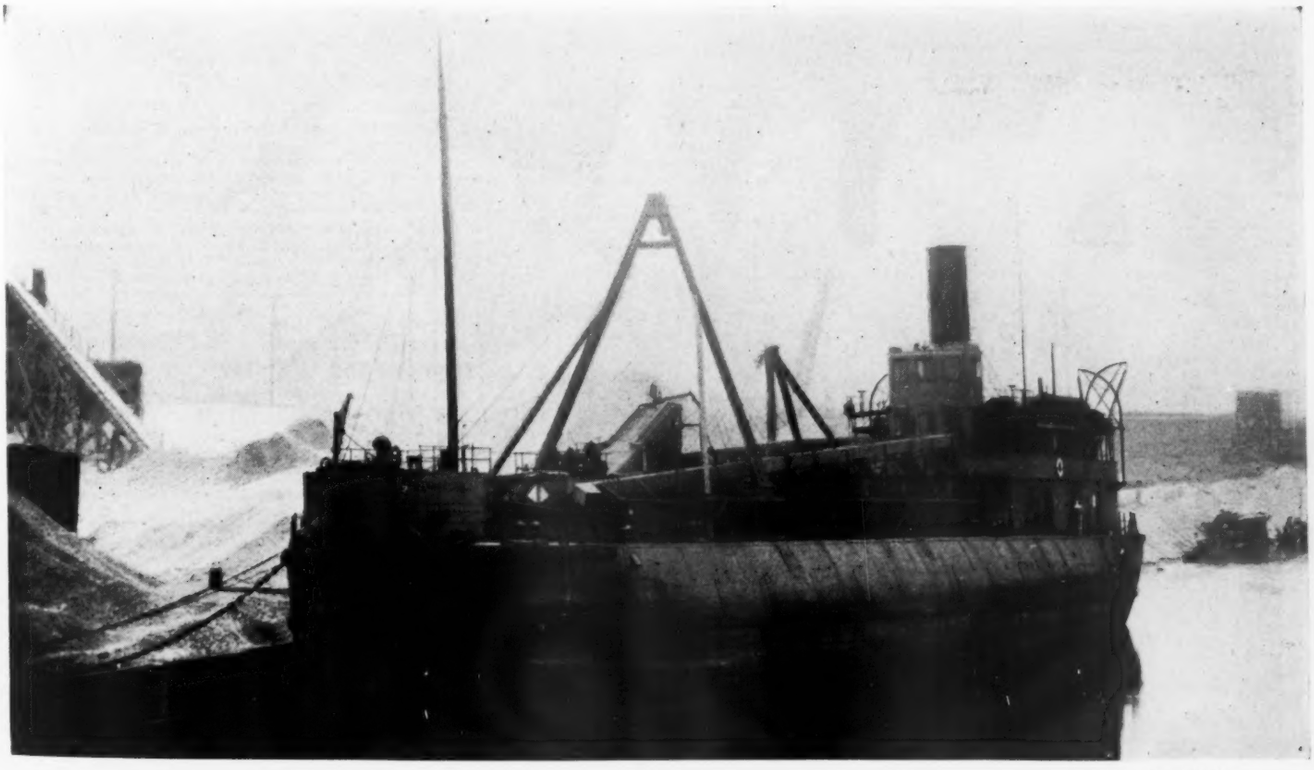
The first carload of cement in bulk to arrive in Seattle came here from the Superior plant, to be used in construction of a new grain storage elevator at the Fisher Flouring Mills on the West Waterway. This car contained the equivalent of 1000 sacks of cement.

The equivalent of 85,000 sacks of bulk cement has been shipped from the Superior plant for construction of the Longview bridge over the Columbia river.

The Superior company is now shipping in bulk an order for 1,200,000 sacks to the Winston Brothers Co. of Seattle, to be used in construction of the Diablo dam.

Low-Cost Runways and Landing Fields for Airports

CIRCULAR No. 67, of the above title, has been recently brought out by the Asphalt Association, New York. The paper supplements other asphalt airport information published by the Asphalt Association. and it and the other similar publications may be had free from the Asphalt Association, New York.



P and A Photo

The "Andaste," gravel carrier, which went down with her entire crew of 25 in a recent Lake Michigan storm

News of All the Industry

Incorporations

Mercedes Concrete Pipe Co., Mercedes, Tex. Increased capital stock from $76,200 to $125,000.

Twin Boro Cement Block Corp., Dumont, N. J., $10,000. Albert J. Wuytack, Dumont.

Auburn Concrete Products Co., Auburn, Wash., $40,000.

Freel Sand and Gravel Co., $5000. W. L. O'Malley, 44 Court St., New York City, N. Y.

Brazos Valley Sand and Gravel Co., Dallas, Tex., $500. Jack F. Perkins, Alex W. Spence and Philip Lindsley.

Southern Sand and Gravel Co., Memphis, Tenn., 500 shares no par value. N. A. Dye, Henry M. Crymes and J. W. Wrape.

Long Island Tile Crete Corp., Wilmington, Del., 20,000 shares common. To deal in silica rock, sand, etc.

Granville Wash Sand and Gravel Co., Milwaukee, Wis., 100 shares at $100 each. Peter F. Leuch, Louis E. Fichaux and John C. Fellenz, Jr.

Superior Limestone Co., Inc., Bloomington, Ind., 500 shares, par value $100 each. Charles A. Colgren, Cecil C. Wampler and Carl P. Wampler.

Lincoln Co., Bridgeport, Conn., $50,000. To deal in cement and gravel. Harry D. Fitzgerald, Sr., Harry D. Fitzgerald, Jr., and William J. Kiernan, Bridgeport.

Providence Transit Concrete Corp., Providence, R. I., 1000 shares common, no par value. John J. Rosenfeld, C. B. Keach and James H. Hogan, Jr., Providence.

Agrolith Corp. of America, Chicago, Ill. (room 1245, 230 S. Clark St.), 10,000 shares no par value. To deal in cement, "Agrolith," etc. Fred N. Wilson, J. S. Morris and E. W. Hubbard.

Sensibar Sand Co., Gary, Ind., filed papers redeeming $800,000 preferred capital stock and reducing the common capital stock in the sum of 44,300 shares, no par value.

Colloidal Phosphate Sales Co. of New England, Boston, Mass., $50,000; 500 shares, $100 each. Rupert A. Fairbairn, president; Frank M. Groccia, 119 Woodcliffe Rd., Newton, Mass., treasurer; Grace M. Littlewood.

Quarries

Florida Basic Rock Co., Marianna, Fla., has installed a new crusher made by the Ocala Iron Works, Ocala, Fla.

Wisconsin Granite Co., Chicago, Ill., has not discontinued crushing operations at its Redgranite, Wis., quarry, and the statement to that effect as published in this section in the September 14 issue of ROCK PRODUCTS is in error.

Carl Furst Stone Co.'s new quarry in Monroe county, near Bloomington, Ind., is now operating. Six carloads of limestone, the first consignment of stone quarried, were received at the company's mill at Bedford, Ind., recently.

Cleveland Quarries Co., Cleveland, Ohio, entertained 35 of its foremen at a banquet recently at the Newell Hotel, Elyria, Ohio. A course dinner was served, after which interesting talks were given by various representatives of the company.

Southern Mineral Co., Winnfield, La., supplied the limestone for the Marble Quarry parish highway. The road, which has just been opened, is five miles in length and links Winnfield with the plant of the company.

The Atlas Rock Co., Miami, Fla., which recently leased the Seminole Fruit and Land Co.'s property at Red road and 14th street, as reported in previous issues of ROCK PRODUCTS, is already producing crushed rock. The plant has a capacity of 1000 tons daily.

Weldon Spring Quarry, Weldon Spring, Mo., met with a bit of serious damage recently when a heavy charge of dynamite, set off to loosen up rock, knocked the framework of the crusher out of line. Routine business was suspended while the company's force of workmen rushed repairs on the crusher.

Societe-de-Merbes-Sprimont, Brussels, Belgium, reported to be the largest producer of marble in the world, has signed a contract making I. Fischman and Sons, Philadelphia, its exclusive agent in the United States, Canada and Cuba. Merbes-Sprimont is a consolidation of a number of the largest marble quarries in Europe and Africa. I. Fischman and Sons has formed a subsidiary, the Consolidated Marble Corp., which will take over the contract with the Brussels company and the marble interests of the Fischman company.

Sand and Gravel

H. E. Johnson and Son Sand and Gravel Co., Tippecanoe City, Ohio, has purchased 150 acres near its present plant and is planning erection of a new plant on the site.

Galesburg Sand and Gravel Co., Galesburg, Ill., has received contract for the graveling of 1½ miles of road south of Altona, Ill., at $1.60 per ton. Approximately 3500 tons of gravel will be used.

Ohio River Sand and Gravel Co., Wheeling, W. Va., suffered losses when its gasoline boat, the "Sand Boy," burned on the Ohio river near Tiltonville on September 13.

Coogan Gravel Co., Peoria, Ill., was awarded contract on its bid of $1.78 a ton for furnishing gravel for the "Berwick" road from Abingdon west to the Warren county line. Approximately 4600 tons of gravel will be required.

Estill Springs Sand and Gravel Co., Nashville, Tenn., is completing work on a new plant at Estill Springs, Tenn., to supplement the first unit, placed in operation in 1927. Additional storage bins have been erected and connecting track built between the pit and plant.

Standard Gravel Co.'s new $75,000 plant on the Ouachita river near Fort Lookout, Ark., will soon begin operations. The company holds a permit for dredging the Ouachita river along a 14-mile stretch centering the plant. Approximate capacity of the new plant is 25 carloads of sand and gravel daily.

Tennessee Valley Sand and Gravel Co., Sheffield, Ala., has received permission from the Florence City Commission to use a certain area on the bank of the river near the canal on the Florence side to put in a dry dock where the company's barges and other river equipment can be repaired.

W. W. Giggey and Co., contractors for the second Tennessee Pass highway project, are erecting a gravel crushing and screening plant a half mile above the Arkansas river bridge on the Tennessee Pass road. An electric power line has been run to the plant by the Public Service Co. and all of the machinery will be electrically driven.

Dolese Bros., Chicago, Ill., who operate a sand and gravel yard at Oklahoma City, Okla., has brought suit against that city to restrain it from enforcing a nuisance order against its sand and gravel yard. The city's motion to dismiss this suit was stricken from the federal docket and a date for hearing this motion will be set later on. In the meantime the company will continue to operate here.

Cement

San Antonio Portland Cement Co., San Antonio, Tex., is installing "Norblo" dust-collecting equipment in its new pack-house, which when completed will be one of the most modern in the country.

Yosemite Portland Cement Corp., Fresno, Calif., has moved its sales offices from the Standard Oil Bldg., San Francisco, to Room 305, Board of Trade Bldg., 444 Market St., San Francisco.

Aetna Portland Cement Co., Fenton, Mich., is having a record year of production. It is expected that this year will be the largest in the history of the plant.

Keystone Portland Cement Co., Bath, Penn., is making improvements in its primary crushing department. "Norblo" dust-collecting equipment is to be installed.

Idaho Portland Cement Co., Inkom, Idaho, has awarded contract for five storage silos at its plant, with a total capacity of approximately 75,000 bbl., to the Macdonald Engineering Co., Chicago, Ill. Construction work is already under way.

Port Stockton Cement Co., Port Stockton, Calif., has acquired 30 acres of waterfront property from the city of Stockton, according to newspaper report. Cost of the property was $89,000. As reported in ROCK PRODUCTS, September 14, a cement mill to cost $1,750,000 will be constructed.

Wolverine Portland Cement Co., Coldwater, Mich., recently purchased from Allis-Chalmers Manufacturing Co., Milwaukee, Wis., a rotary kiln 10 ft. in diameter and 300 ft. long. The kiln is designed with five supporting tires and the carrying mechanisms are of the two-roller type, oil lubricated.

Lime

Arkansas Lime Products Co., White Cliffs, Ark., has installed a new crusher of 2500 tons daily capacity. The crusher was supplied by the Ocala Iron Works, Ocala, Fla.

Calhoun Lime Supply Co., Hardin, Ill., is erecting a new factory building for the manufacture of spray material for orchard insects. Ed Gotway is president of the company.

E. J. Groth, Port Washington, Wis., is adding another unit to his lime plant. The unit will produce pulverized lime in a separate building which is being erected and necessary machinery installed for the purpose.

Agricultural Limestone

River Products Co., Iowa City, Iowa, supplied 643 tons of agricultural limestone for Washington county's first "Limestone Special."

Marshall, Putnam County, Ill. Approximately 1000 tons of agricultural limestone has been recently ordered for farmers of this county.

Alta, Ill. Twelve carloads of agricultural limestone have been unloaded adjacent to farms along the Rock Island tracks near here.

Concord, Calif. The agricultural limestone plant near here on Cowell road has been abandoned. Machinery and equipment are being shipped to Ukiah, Calif., for use at a new plant at Laughlin.

France Stone Co., Toledo, Ohio, has donated 400 tons of agricultural lime to 12 boys of the Kenton (Ohio) High School vocational agricultural department, to be used in sweetening soil on land being farmed by the students.

Northwestern States Portland Cement Co., Gilmore City, Iowa, is offering limestone for agricultural purposes, which is not as finely pulverized as their regular limestone, at 50 cents per ton at the quarry.

Blackwater Stone Co., Kansas City, Mo., is supplying agricultural limestone for the Huntsville, Mo., territory. Two carloads were delivered to farmers in this district recently, and the demand is steadily increasing.

Cumberland County, Va. T. A. Barrs, teacher of agriculture, has secured the co-operation of the Bertha Mineral Co. in a special lime campaign which he is putting on in the county. The company will give five cars of lime to the farmers of Cumberland county.

Laughlin, Calif.—A crushing plant for preparing agricultural limestone for the farmers of this section is being installed here under the supervision of Oswald Wilson, agricultural agent for the California Western Ry. The farmers will be charged not more than $4 per ton f.o.b. Laughlin.

Ozark County, Mo. Farmers of this district recently held a meeting and decided on purchasing a crusher to crush limestone for agricultural purposes. The crusher, it is expected, will be in operation soon, and judging from orders now being placed it is likely that 200 tons will be crushed at one set.

Buckhorn, Iowa. Lew Bock of Baldwin, Arthur Daniels of Lost Nation, and H. E. Skott of Buckhorn, Iowa, recently bought a limestone crusher from Fred Willamack and Fred Rehmke, farmers near Oxford Junction. The latter has crushed 300 tons of limestone, and Mr. Willamack says that he has spread an average of three tons to the acre on his farm, at a cost of $10 an acre. Roy Dyas of Andrew, Iowa, who bought 200 tons at $1.25 a ton, contends that buying is cheaper than crushing. P. C. Koch, George Larkey and Douglas McDonald have limestone pits on their farms. Isaac Voelpel of Baldwin, Iowa, is crushing limestone for A. E. Willey, farmer east of Nashville, Iowa.

Cement Products

Belmont Cement Block Co.'s plant, Upper Darby, Penn., was recently damaged by a fire. The loss is estimated at $20,000.

Newhouse Crusher has Unrestricted Receiving Openings allowing Large Feed

ONE 7-inch Newhouse crusher, operating in closed circuit with a scalping screen, is handling the oversize from this pit. The material from the 24-inch belt conveyor, operating at approximately 280 feet per minute, is screened, the minus 2-inch ring size is by-passed and the oversize goes to the crusher. Much of the oversize consists of granite boulders, many of them having a one way dimension little less than the width of the crusher receiving opening. Notwithstanding this large feed, the crusher operates without bridging. This is due to the crusher's short rapid crushing stroke which also gives large unit capacity.

The few working parts, absence of gears and general simplicity of the Style "B" Newhouse crusher makes it a very economical machine to operate. Suspending the crusher by cables from the framework of the building eliminates expensive foundations and reduces installation costs. Built with receiving openings of 7, 10 and 14 inches.

Bulletin 1469 describes this *crusher that needs no foundations.*

ALLIS-CHALMERS

Milwaukee, Wisconsin

H. M. Walden, Brady, Tex., is organizing a company to manufacture "Duntile" concrete building tile.

General Material Co., St. Louis, Mo., offices in the Buder Bldg., has acquired 8½ acres on Connecticut street for erection of a ready-mixed concrete plant.

Transit Mixed Concrete Co., Morris Plains, N. J., has plans for a central proportioning and distributing plant for concrete production, to operate under automatic mechanical system for loading motor trucks, these to be equipped to mix material while en route to point of delivery. Initial plant to cost more than $50,000 with equipment.

Bent Concrete Pipe Co., Grosse Bldg., Los Angeles, Calif., has begun construction of initial building for its new plant at West Dallas, Tex., where the company recently acquired a 10-acre tract. The building will cost $100,000 with equipment. Other units will be built later; entire project, it is reported, will cost over $500,000.

Gypsum

Canada Gypsum and Alabastine, Ltd., Paris, Ont., supplied gypsum products for the construction of all partitions, the insulation of all beams and the sheathing of pipes throughout the new Medical and Dental Bldg. at Vancouver, B. C.

United States Gypsum Co., Chicago, Ill., is reported to have plans for an addition to its Philadelphia plant, to cost about $150,000 with equipment. The company has also filed affidavit changing its agent for East Chicago, Ind., to A. A. Frosdick.

Miscellaneous Rock Products

A. B. Archibald, St. Petersburg, Fla., has discovered a large deposit of travertine rock on property of his not far out of the city limits. Tests have been made of the material and it has been found to be of very high quality. No plans have been made as yet for development of the property.

Coronet Phosphate Co.'s mining operations east of Mulberry, Fla., are progressing rapidly. One building has already been erected, a second is under way, and it is reported that plans have been made for a third. The phosphate rock is shipped on the Seaboard Air Line Railway to Pembroke for treatment at the company's plant there.

Obituaries

Ray P. McGrath, for 15 years manager of the San Francisco office of the Sullivan Machinery Co., Chicago, Ill., died August 25. Mr. McGrath had been associated with the Sullivan Machinery Co. since 1906 and previous to his managership of the San Francisco office was connected with the New England sales office of the company.

Personals

J. D. Henderson, of the Pioneer Sand and Gravel Co., Seattle, Wash., has been elected vice-president of the Sales Managers' Association of Seattle.

Joseph W. Eshelman has been appointed representative for the Pennsylvania Pump and Compressor Co., Easton, Penn., in the Birmingham, Ala., district, with office at the American Traders Bank Bldg., Birmingham, Ala.

W. H. Klein, general manager, Southern Division of the Pennsylvania-Dixie Cement Corp., presented at the recent Chattanooga meeting of the Southeastern Shippers' Advisory Board a resume of the cement industry's development in the Southeast.

Perry W. Olliver has been made manager of the San Francisco office of the Sullivan Machinery Co., Chicago, Ill., to take the place of the late Ray P. McGrath. Mr. Olliver has been with the Sullivan organization since 1914 and with the El Paso office of the company for the past eight years.

Alfred E. Roberts, consulting engineer of the Port Stockton Cement Co., Stockton, Calif., was the speaker at a recent weekly meeting of the Stockton Chapter of the American Association of Engineers. Mr. Roberts gave an interesting talk on cement manufacture.

John W. McCoy, formerly assistant general manager of the explosives department of E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has been appointed general manager. **Edward B. Yancey,** formerly manager of the Birmingham plant of the company, and for the past year acting in an executive capacity at the home office, has been made assistant general manager of the department.

Manufacturers

General Electric Co., Schenectady, N. Y., will consolidate its fourteen wholesale distributing corporations into the General Electric Supply Corp. (Del.), effective October 1. C. E. Patterson will be president of the new company.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., recently acquired a 22-acre site in Newark, N. J., for a new warehouse and service station to serve the entire northern New Jersey industrial area.

Blaw-Knox Co., Pittsburgh, Penn., has increased its board of directors from 16 to 22 members, with the addition of J. P. Allen, Frank Cordes, J. R. Dunsford, D. Leynon, Samuel Harden Church and C. M. Thorpe.

Trackson Co., Milwaukee, Wis., has appointed L. A. Snow Co., 134 International Right of Way, Spokane, Wash., as distributors of Trackson tractor equipment for McCormick-Deering tractors. Don E. Lillie is manager of the L. A. Snow Co.

Republic Iron and Steel Co., Youngstown, Ohio, at its recent directors' meeting voted an appropriation of $1,000,000 for the building of a mechanical tube plant at the Trumbull Works at Warren, Ohio.

H. D. Conkey and Co., Mendota, Ill., is building an addition to its Mendota, Ill., plant which will double present capacity. The addition is to be used for the fabrication of materials only, and will be equipped with the most modern tools for steel fabrication.

Wagner Electric Corp., St. Louis, Mo., has opened a new branch sales office at 734 Allen Bldg., Dallas, Texas, for the entire state of Texas and parts of Louisiana and Arkansas. Alfred B. Emrick, formerly branch manager of the Pittsburgh office of the company, will be in charge.

Linde Air Products Co., New York City, has established a new oxygen plant at 1628 Cascade St., Erie, Penn. J. J. McKeen is superintendent of the plant and R. S. Hamilton, whose headquarters are at the East Buffalo Linde plant, is district superintendent.

M. A. Long Co., Baltimore, Md., has been awarded contract and has already started construction of three silos 50 ft. in diameter and 80 ft. high, to be erected at Jordanville, N. Y., for the Mohawk Limestone Products Co. The silos will serve as storage for pulverized limestone and lime, and will have a total capacity of 17,700 tons.

Van Dorn Electric Tool Co., Cleveland, Ohio, is now using a new electric tool demonstration car to assist jobbers' salesmen in demonstrating Van Dorn tools in operation. The car consists of a specially designed closed body mounted on a chassis, and the large rear door, when opened, shows the various electric tools in neatly arranged sections, easily accessible for immediate use.

Link-Belt Co., Chicago, Ill., has added the following sales agents: Charles L. Miller of Denver and Salt Lake City will handle Utah, Colorado and the Intermountain territory. James Van Buskirk, 911 Martin Bldg., Birmingham, Ala., will have the Alabama territory. The Clyde Co., 309 Magazine St., New Orleans, La., will handle the territory comprising the state of Louisiana and the south half of Mississippi, with the exception of a few counties in the southeast corner. Holloran Tractor Co., 188 Butler Ave., Memphis, Tenn., will serve the territory around Memphis. Greater New York, including Westchester, Nassau and Suffolk counties, will be served by the United Hoisting Co., 136th and Locust Sts., New York City. For Pennsylvania, Ensminger and Co., 181 South Washington St., Wilkes-Barre, Penn.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention **Rock Products.**

Oxwelding. Illustrated booklet on oxwelding aluminum and its alloys. THE LINDE AIR PRODUCTS CO., New York City.

Trap Rock. Folder setting forth advantages of trap rock as a satisfactory coarse aggregate for concrete in construction work. JOHN T. DYER QUARRY CO., Norristown, Penn.

Cranes. Bulletin **No. 47** on motor truck mounted cranes for steel erecting, stone setting, rigging work, and general lifting service. UNIVERSAL CRANE CO., Lorain, Ohio.

Locomotive Cranes. Bulletin describing 15- and 20-ton locomotive cranes, powered by gasoline, electric or diesel motors. Illustrated. THE THEW SHOVEL CO., Lorain, Ohio.

Squirrel-Cage Motors. Seven types of squirrel-cage motors are discussed and compared with each other in a new 24-page bulletin, **No. 165.** WAGNER ELECTRIC CORP., St. Louis, Mo.

Lourie Ladders. Bulletin on the improved platform and steel rung types of "safety" ladders for industrial plants manufactured by LOURIE MANUFACTURING CO., Chicago, Ill.

Arc Welder. Bulletin describing and illustrating the automatic arc welder, tractor type, for lap- and butt-welding. LINCOLN ELECTRIC CO., Cleveland, Ohio.

"Caterpillars" for Airports. A unique 20-page book, third of its kind, telling of the use of "Caterpillar" tractors at airports for removing snow. CATERPILLAR TRACTOR CO., San Leandro, Calif.

Centrifugal Sand Pumps. Forty-five page catalog, **No. 7,** on Wilfley sand pumps, completely illustrated, with operating data, table of dimensions, etc. A. R. WILFLEY AND SONS, INC., Denver, Colo.

Diesel Engines and Diesel-Powered Draglines. Illustrated bulletin, No. 800, completely describing Page diesel engines and draglines in sizes from 2 to 5 yd. and larger. PAGE ENGINEERING CO., Chicago, Ill.

High Early Strength Portland Cement. Bulletin outlining economies obtained with "Incor" Perfected High-Early-Strength Portland Cement in the oil industry. INTERNATIONAL CEMENT CORP., New York City.

"Making Primers." Explosives Service Bulletin dealing with correct priming and supplementing previous bulletin on "Placing the Detonator to Get the Best Results." E. I. DU PONT DE NEMOURS & CO., INC., Wilmington, Del.

Rock Crushing Plants. Ninety-two-page booklet in Spanish, **No. 1464-S,** on modern rock crushing plants. Excellently illustrated, with full details and specifications. ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.

High-Early-Strength Concrete. Illustrated bulletin showing how high-early-strength concrete is made with Universal cement, and its advantages for construction work. UNIVERSAL PORTLAND CEMENT CO., Chicago, Ill.

Welding Rods—Alloy Steels Equipment. "Gold in Your Own Back Yard" is the title of a booklet showing the various uses of Stoody products on equipment used in the rock products industries. STOODY CO., Whittier, Calif.

Oil Burning Equipment. Illustrated booklet on portable oil torches, oil regulating cocks, oil pressure regulating valves, steam atomizing oil burners, and low pressure P-G-S burners. COMBUSTION ENGINEERING CORP., New York City.

Gasoline Engines. The story of the evolution of power in many industries is attractively told in No. 9, Volume V, of the "Continental Red Seal" published by CONTINENTAL MOTORS CORP., Detroit, Mich.

Explosives. Density of explosives as a factor in execution and blasting costs is comprehensively treated in an article by A. E. Anderson in the August issue of the Explosives Service Bulletin. E. I. DU PONT DE NEMOURS & CO., INC., Wilmington, Del.

Safe Practices Pamphlet on Conveyors. Pamphlet **No. 35** dealing with hazards in connection with the operation of mechanical conveying systems, and presenting practical methods for overcoming these dangers. NATIONAL SAFETY COUNCIL, 108 E. Ohio St., Chicago.

Nickel Alloy Steel Products. A Buyers' Guide listing nickel alloy steel products most frequently inquired for, with the names and addresses of the companies carrying the various products. INTERNATIONAL NICKEL CO., INC., New York City.

Road Building Machinery. Catalog **No. 2901** illustrating and describing in detail Warco road machinery, including power graders, rollers, wheeled scoops and rear type crawlers for application to industrial tractors. W. A. RIDDELL CO., Bucyrus, Ohio.

Gas Welding and Cutting Apparatus. Catalog **No. 29,** containing 40 pages and covering complete line of gas welding and cutting, lead welding, brazing and decarbonizing equipment, automatic and hand welding and cutting machines and torches, gas pressure regulators, acetylene generators, welding supplies and general information. TORCH-WELD EQUIPMENT CO., Chicago, Ill.

Generators and Bedplates. Bulletin **20355-A** covering Type ES engine driven alternating-current synchronous generators, and bulletin 3746-E announcing a new line of fabricated synchronous motor generator sets. Also bulletin **1856,** covering bedplates for types SVR and DVR speed reducers. WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Penn.

Diesel Engine Wear—Its Causes and Prevention. The August issue of Lubrication is devoted entirely to a special descriptive picture of the Diesel engine, with special attention to those factors which may affect the extent to which wear occurs; emphasis has been placed on operating conditions which should be studied. THE TEXAS CO., New York City.